WOODFUEL ENERGY SUPPLY TO RURAL INDIA : PROBLEMS & PERSPECTIVES

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BY

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Being a thesis submitted in part
fulfilment of the requirements
for the degree of
Master of Environmental Studies

CENTRE FOR ENVIRONMENTAL STUDIES

UNIVERSITY OF TASMANIA

OCTOBER, 1983

to be confirmed 1984

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STATEMENT

This thesis contains no material which has been accepted for the award of any other degree or diploma in any University or Institution and to the best of my knowledge and belief the thesis contains no copy or paraphrase of material previously written or published by any other persons except where due reference is made in the text of this thesis. In addition, I alone remain responsible for the thesis's faults or short-comings.

Kedar N. Baidya

October, 1983.

ACKNOWLEDGEMENTS

I am grateful to my supervisor, Dr. J.J. Todd, acting Director of the Centre for Environmental Studies, for his guidance in the preparation and planning of this study. I would admit that, without the initial encouragement and inspiration of Dr. Todd, I would not have attempted the thesis. I am also particularly indebted to Dr. Ansley Kellow, Lecturer, Centre for Environmental Studies, Dr. Bruce Davis, of Political Science, for the constructive criticisms, comments and suggestions at various stages of this study.

My thanks are due to the Government of Karnataka and the Government of India for granting me study leave overseas. Thanks are due to the University of Tasmania for offering me a Postgraduate Scholarship for completion of the Master of Environmental Studies. Additionally, I am grateful to Prof. Alec Lazenby, Vice-Chancellor, University of Tasmania for providing additional funding for three months to complete the thesis.

I am further indebted to my Indian collegaues, amongst whom a few may be mentioned. They are: Mr. K.A. Kushalappa, Dr. S.N. Rai, of Karnataka Forest Department, Mr. K. Prasad and Mr. B.K.P. Sinha of Uttar Pradesh Forest Department, Mr. S.K. Mitra of Maharastra Forest Department and Mr. J.C. Kala of Tamil Nadu Forest Department - who helped me with some valuable firsthand materials. Thanks are also due to Mr. D.K. Jain, Secretarial Assistant, Ministry of Agriculture and Miss Sipra Mandal, Information Officer, Ministry of I&B, Government of India, who kept me uptodate by providing various source materials related to the present study.

Finally, my thanks are due to Mr. Roy Davies, who helped me in structuring the thesis. It would be an unpardonable offence if I were not to mention my wife's valuable service of typing the initial draft of the thesis. Further, thanks are due to Mr. Philip Hoysted, Prof. Tadashi Miyamoto, and Mr. Hideyuki Mori, colleagues from the Centre of Environmental Studies whose helping association and charming company have helped me to cope even at the most difficult period of my stay in Hobart. Lastly, my thanks are due to Mrs. Gill of the Philosophy Department for typing the final manuscript of the thesis.

ABSTRACT

India, in the present time, is passing through an acute shortage of fuelwood in the rural sector where threequarters of her population live. To solve this "Second Energy Crisis" of India, there have evolved several technical solutions of which the rural energy plantation or the Social Forestry Plantation Programme is the most important one. Various physical, financial and technical constraints related to these programmes can be solved by technical or scientific means. But the real issues of the problem lie deeper, enmeshed in the Indian social system which is highly complex in nature.

There are enormous temptations to tackle the solution of the problem through technical means, but this is only a partial remedy. What is more important is the forming of policy and its implementation through administrative mechanisms. This is because any attempts to apply only tehnical innovation in the existing unequal society of India have always resulted in failure. In spite of increased production of food grains through the "green revolution", the poorer sections are still starving - because they have no access to these food grains. Similarly, through technical means, there will be enormous generation of fuelwood resources - but that does not guarantee that the poor will have it. What is needed is a radical approach to evolve good policy through which the "poorest of the poor" will have access to this resource. Until that is done, rural India's energy problem will remain as it is.

1 FUELWOOD CRISIS OF INDIA

CHAPTER ONE

1. FUELWOOD CRISIS OF INDIA : MAGNITUDES OF THE PROBLEM

Introduction

The general belief is that the land has the power to regenerate, especially when periodic depredations are long enough apart to allow it to replenish itself; but during the last century rapid and extensive inroads into the untouched and unspoiled forests, particularly in the name of economic development, have created irreparable loss to most of the world's ecosystem.[1]

There has been a steady increase in human population in the less affluent nations of the world over the last half century. This has tremendously affected the availability of food, fuel and other resources. Fuelwood is a most important resource upon which many of the less fortunate have to depend for their supply of energy. The commodity is essential for their survival at the present time; this is why considerable attention of social scientists, politicians and administrators has been given to the problem. More than one-third of the world' population depends on woodfuel for cooking, house-warming and other domestic uses.[2] About 86 percent of the total wood consumed in these countries is used as fuel, at least half of this being used in cooking.[3] The situation of collecting woodfuel is becoming so desperate, especially in the Indian rural sector, that wood poaching from reserved forests has become a chronic problem for forest departmental staff.[4] Some reports indicate that hedges around homes and even scaffolding of building sites are taken to meet firewood shortages in some areas.[5]

It has been estimated that one and a half billion people in the

third world satisfy their basic energy need from wood and charcoal and another one billion at least 50% of their energy needs in this way.[6] Population growth is far outpacing the growth of new trees. Woodfuel shortages have resulted in soaring prices of the commodity, growing stresses on incomes, physical energy expenditure to collect the produce, burning of animal manures which could be used to enhance food production, and the creation of irreversible ecoclimatic disasters in the area.[7] Most people in the western world have very little idea how important and significant fuelwood could be to the millions of people of the developing world. This could be seen in the Indian context from the comment of an Indian official: "even if we somehow grow enough food for our people in the year 2000, how in the world will they cook it?" [8]

Firewood scarcity is most acutely felt in the rural sector of India where about 550 million people live.[9] It is estimated that an average yearly use of one fifth of a ton to well over a ton of woodfuel by each individual, swells to a huge quantity of wood.[10]

In many areas the price of fuelwood has been accentuated by the soaring cost of imported kerosene, which was till recently the alternative energy for the poorer section of the urban and semi-urban dwellers. Gathering of woodfuel, especially in mountainous regions of the country, has become almost an entire day's work; whereas a decade earlier this would not have taken more than an hour or two.[11] The price of woodfuel is diverting a considerable portion of the family earnings, with a result that the hard-pressed rural poor have to curtail some of the most necessary items from the daily consumption list.[12]

As firewood prices go up, landowners with wood resources bring the commodity to the cities or nearby towns to sell at higher prices.

In recent times the idea of commercialisation of the commodity raised hopes that entrepreneurs would start planting trees on a profitable and labour-intensive business basis.[13] Reports from Indian States, however, show a very gloomy picture. The rural poor with little or no disposable cash are in deep trouble.[14]

The firewood scarcity problem failed to draw world attention, because the shortage only appears locally. The problem did not affect the politicians, the elites and the administrators of those countries. The gravity of the problem can be seen in the following. "But the problem is spreading into larger areas, increasing in severity, and exacerbating other problems. In that sense, it is like the oil crisis. If dwindling oil reserves threaten the productivity of an industrial system, the deforestation that results in part from gathering firewood threatens a significant portion of the world's agricultural system".[15] The balanced ecoclimatic conditions of an area depend upon its vegetation cover. Once the vegetation is lost the area is susceptible to ecoclimatic disasters. The recent repetitive droughts, floods and severe landslides in the Indian Himalayan/Sub-Himalayan belts reflect some of these results.[16]

Before going into details of the problem it is relevant to outline what the present study envisages, and how it has been structured. This we can examine in the next section.

1.1 AIMS, STRUCTURE AND BIBLIOGRAPHY OF THE THESIS

India at the present time is heavily burdened with a rural energy crisis. The answer to this problem has been sought by planting trees - making the rural people "tree conscious". This is the technical aspect of the problem.

The aim of the present study is to demonstrate that the technical solution of a problem is only a part of the solution. It cannot satisfy

the totality of the problem. What are more important are institutional factors related to the existing socio-political order of rural India. To establish the theme of the thesis, various social, cultural, religious, political and administrative factors which are strongly interlinked with the existing rural system have been analysed. These factors are more important in the solution of a problem like the fuelwood crisis.

The thesis does not attempt actually to propose a programme for overcoming the problem of the fuelwood crisis. Even from a non-technical angle, social forestry with its macrolevel statistics looks impressive as a solution to the present problem, but on microlevel analysis the benefits are much harder to identify.

It may be relevant to add a few words on the structural arrangement of the thesis. The introductory chapter provides the statistical evidence on the fuelwood crisis in India, including demand/supply, conflict of interests on the newly generated resource. In the second chapter the existing rural social system along with the interlinked factors (social, religious, political, administrative, etc.) have been analysed, and the discussion shows how these interact and stand in the way of woodfuel generation. In the third chapter (social forestry concept and constraints), important concepts and constraints of social forestry have been dealt with. In the final chapter the thesis concludes with arrangements emphasising the need for greater consideration to be given to social matters.

Preparation of bibliography - much has been written on this topic, many references which might be of interest to workers in this field are not included in the text, so a reasonably extensive bibliography is included in the thesis.

In the next section, in an overview, we can consider the rural

energy problem of India and show that this has become a real survival question for over three-quarters of the country's total population. The situation is so desperate and urgent that India really needs an immediate solution to this vitally important problem.

1.2 PROBLEM OF RURAL ENERGY SUPPLY IN INDIA

In the rural scene woodfuel collection is a daily task, and mostly involved are women and children. Some reports describe villagers walking 10 km up and down a steep mountain in the Himalayan belt of Utter Pradesh and this takes place on three out of four days for up to six or seven hours. The collector brings back about 25 kg of woodfuel each trip.[17] The situation in plain areas of the Southern States (Karnataka) is not much better, where each firewood gathering family spends about 2.6 hours daily, travelling an average distance of 4.8 km.[18] Such precarious situations have been described: "unwitting victims of the continuing energy hunger in the Third World villages" and, "an abominable energy cycle operating to eat food to convert it into human energy and then spend most of it in the process of collection of the energy to cook the next meal".[19]

The prices of the non-commercial energy sources like woodfuel are determined by several factors such as demand, unemployment in local communities, and the related market forces. A large proportion of village women and children remove loads of fuelwood to sell in nearby urban areas, cities (Figure 1.1) or local shanty towns. Even organised illegal cutting and selling to contractors, who take the commodity to distant cities, is not uncommon.[20] The age-old public rights to collect firewood from the forest in head loads (dried material only), a fixed quantity of wood for domestic uses, like house construction, repairs, cremating dead bodies or performing religious functions or rituals, etc., are being allowed to the nearby forest dwellers. However, due

FIGURE 1.1 . Firewood collection is not only for satisfying the family's need but a way of livelihood of the rural poor.

Source : Centre for Science and Environment, New Delhi, 1982.

FIGURE 1.2. "Firewood Specials" :- Firewood sellers carry the commodity by train, on many occasions even at the risk of their lives.

Source : Centre for Science and Environment, New Delhi, 1982.

to the pressing economic needs of many rural people, collection of fuel in head loads from nearby forests and selling in nearby market places has now become a way of life for some sections of unemployed people, where the commodity is still available (Figure 1.2). As long as they collect only dried fuel from the forest, forest protection officials cannot take any legal action against them. In some states, forest authorities have started issuing licences with collection fees to show that woodfuel collectors give revenue to the state exchequer, and they no longer get these as free goods. Though the licencees are only allowed to collect naturally-fallen dried material or leftovers after felling, due to shortage of these materials, they sometimes secretly fell living trees and remove them when dried, either by head loads or even by bullock carts, or manpulled carts. It is not uncommon for the local wood collectors, in connivance with lower grade forest staff, to remove forest produce illegally. Very little is known about the economics of firewood collection. The major part of energy statistics deals with energy sources like oil, coal and electricity, though very little of these are used by the common people of India. It appears contradictory to note such remarks: "India is one of the few countries where a systematic attempt has been made to determine the extent of use of 'non-commercial' fuels". Sample surveys in villages and towns were conducted by the Energy Survey Committee of India in the early 1960s. The Committee reported that about 120 million metric tons of wood, 50 million tons of dried dung and 30 million tons of vegetable waste were burnt each year, largely in the villages but also in urban areas.[21] India has some partial data on consumption of firewood, and in comparison with other Third World countries, these may be useful, but they are certainly not enough for complete understanding of firewood consumption patterns and the economics

of its use.[22] Some conflicting views - that the firewood demand of the rural poor is leading to extensive deforestation, with a consequent result of ecoclimatic disasters - are emerging in recent times. It has been stated that "more and more evidence now shows that this deforestation is taking place mainly because of the demand for firewood created by the relatively rich, both in the village and in small towns and cities. If at all, the poor are cutting trees for firewood to meet this demand and earn in the process a pittance of a livelihood".[23] However, we do not need to get into such conflicting arguments when considering the total acute woodfuel shortages which affect the Indian rural sector at the present time. It is relevant to examine other important aspects of woodfuel; in particular, the actual social costs in terms of employment potential, labour, time factors, commercialisation of the product and other options. These we can discuss briefly in the following section.

1.2.1 Rural Senarios: Population,unemployment and labour force

It is argued that in real terms, despite India's so-called industrialisation over the last three decades, the rural people are worse off than they were fifty years ago. The estimated number of people below the poverty line in India (urban and rural together) is nearly 50 percent, i.e. 350 million.[24] An official estimate by the National Sample Survey (NSS 1974) suggests 46 percent of the total population are below the poverty line, whereas the Planning Commission's (1978) figures for the rural sector show about 48 percent in this category.[25] On unemployment, it has been estimated that more than 7 million people enter the job market every year; however, not more than half-a-million can find jobs in industry, trade or government. In the year 1976, there were 53 million people unemployed and this is expected to reach 200 million by the year 2000.[26] The agricultural sector has already

reached its peak level, so far as its capacity to take in labour is concerned. The Indian so-called 'green revolution' has created more unemployment and landless labour in the rural sector. Surplus rural unemployed people pour into the cities and towns with the hope of getting better living opportunities. The result is an abnormal population increase in the cities and towns. Some of the Indian major cities' population figures (Table 1.1) show the horrifying conditions of those cities.

Table 1.1

Population of four major cities in India.

Cities	Population in millions (estimates)	
	1975	2000
Bombay	9.3	17.0
Calcutta	8.5	16.7
Delhi	7.2	11.7
Madras	7.8	12.9

Source: United Nations, 1980.

There appears some paradox when we consider India's recent modernisation, especially in industrialisation, sophisticated production, nuclear technology, space launching, etc.; and contrast these with about 500 million Indians lacking sufficient money to buy even the daily necessities of life. This is emphasised by Myrdal (1968) in the following: "the simple truth is that India badly needs to make a rapid progress in the whole vast countryside by changing all undesirable conditions. Concentrating on certain aspects of development now or in a few districts and settling for slow progress are both inadequate answers for a very underdeveloped country whose labour

force is now increasing probably by 2.5% per year and must stay in agriculture if it is not to swell the city slums and shanty towns."[27] Furthermore, the disparity between urban and rural incomes can be seen in the following: "the gap between rural and urban incomes, often as much as 300-400 percent, makes the city, despite its shanty towns and frustrations, attractive to displaced rural workers."[28]

Before going into the demand and supply position of fuelwood, it is worth considering non-commercial energy use in India, and the relative importance of fuelwood in the total energy of the country.

1.2.2 Non-commercial energy consumption in India.

Firewood, agricultural waste and animal dung are generally referred to as non-commercial forms of energy in India. Substantial quantities of non-commercial fuels are used in a few major industries, e.g. sugar making, and in some unregistered local and household village industries. The analysis in this study is restricted to non-commercial energy use in the household sector only. The annual per capita consumption of all forms of energy in the household sector is assumed to be 0.38 tonnes of coal replacement in rural areas, whereas this is 0.40 (tcr) for urban dwellers.[29]

The consumption of firewood, agricultural waste and animal dung are calculated on the assumption that their shares are in the ratio of 65:15:20 respectively.[30] Table 1.2 shows estimated non-commercial energy demand since the 1950s.

It is clear (from Table 1.3 and 1.4) that while the relative share of non-commercial energy, in the total energy consumption, has gradually diminished over two decades, there has been an increase in the absolute quantity of non-commercial energy consumption (Figure 1.3).

Firewood is the most important source of non-commercial energy in India. This is obtained not only from forests but also from the trees

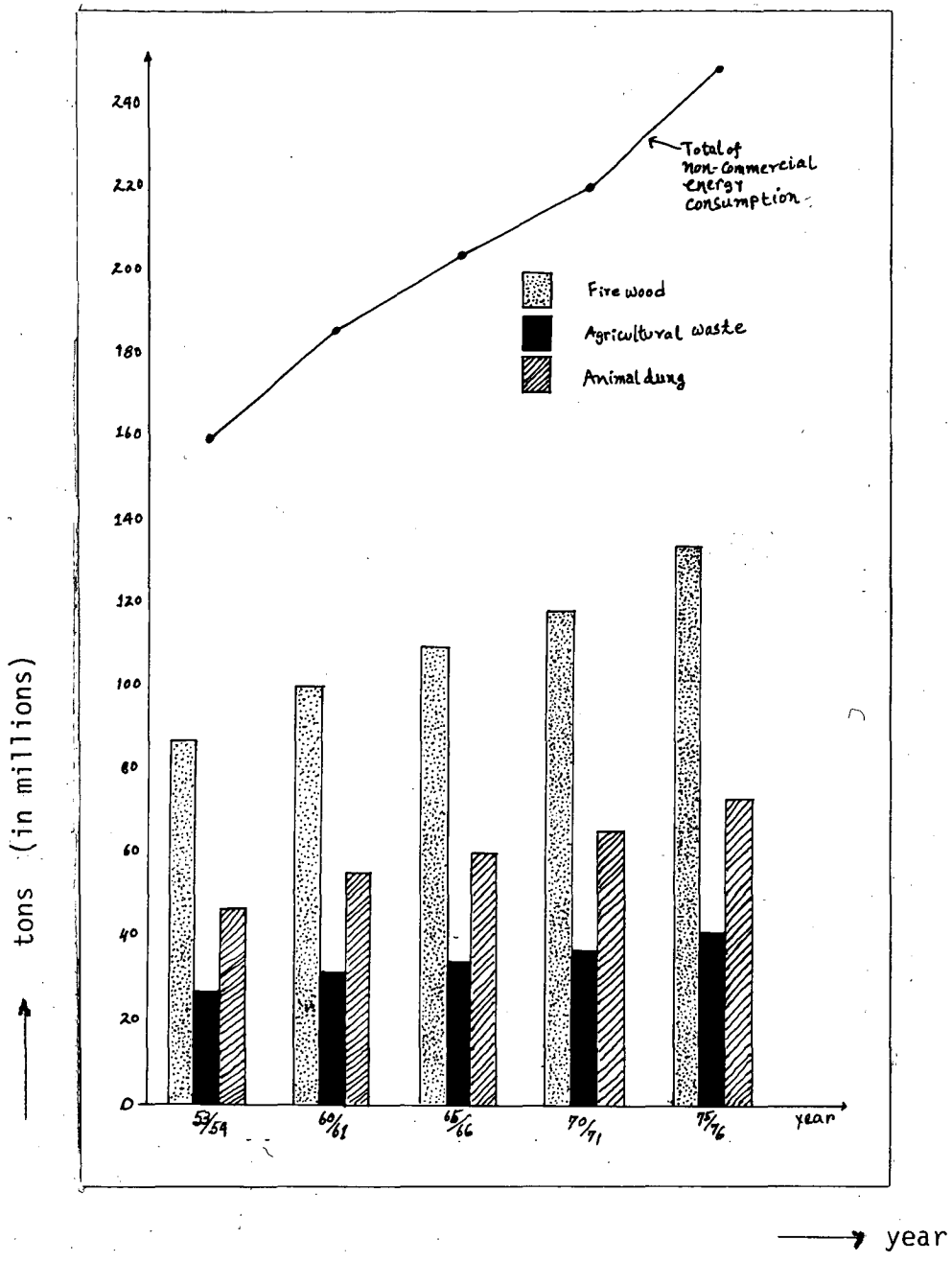

FIGURE 1.3 Trend of Non-Commercial Enegery Consumption in India between 1953-54 and 1975/76.

Source: 1. Report of Working Group on Energy Policy, 1979.

2. Report of the Fuelwood Study Committee, 1982. - Planning Commission, Government of India, New Delhi.

Table 1.2

Consumption of non-commercial energy between 1953-54 and 1975-76 (in million tonnes coal replacement).

Year	Firewood	Agricultural waste	Animal dung
1953-54	81.8	18.9	25.2
1960-61	94.6	21.8	29.1
1965-66	103.8	23.9	31.9
1970-71	112.0	25.8	34.3
1975-76	126.5	29.2	38.9

Source : Energy Policy Report, 1979.
Government of India, New Delhi.

Table 1.3

Relative Shares of Commercial and non-Commercial Energy.

	1953-54 to 1975-76 (in percentage)				
Form of Energy	1953-54	1960-61	1965-66	1970-71	1975-76
Total Commercial	32.4	41.0	47.9	53.4	56.5
Non-Commercial	67.6	59.0	52.1	46.6	43.5
	100.0	100.0	100.0	100.0	100.0

Source : Report of the Working Group on Energy Policy, 1979; Government of India, Planning Commission, New Delhi.

Table 1.4

Energy Consumption: Total Energy in Real Terms
(in million tonnes of coal replacement)

Form of Energy	1953-54	1960-61	1965-66	1970-71	1975-76
(a) Total Com. Energy	60.4	101.2	147.0	197.3	252.7
(b) Total non-com. Energy	125.9	145.5	159.6	172.2	194.6
TOTAL (a)+(b)	186.3	246.7	306.6	369.5	447.3

Source : Energy Policy Report, 1979, Government of India, Planning Commission, New Delhi.

of privately owned plantations and woodlots. The trees may be on the boundaries of the cultivated lands, on roadsides, on river banks, canal sides and around private houses. It has been estimated (1971-72) (National Sample Survey - 28th Round) that 22% (about 25 million tonnes) of firewood is being collected from private lands, gardens, and from trees around residential areas.[31] Though the quantity of firewood obtained from forest lands is inconsistent with the available statistics, it is a fact that the forest lands represent the most important potential source of fuelwood.

The area under forests in India is approximately 0.75 million square kilometres. This is about 23 percent of the geographical area of the country.[32] Though it is generally believed that the forests are being denuded at a fast rate, the government records do not reflect any shrinkage of the area under forests over the last two decades. Another important point is that the per capita areas under forests in

different states of India shows significant variations from a minimum of 0.01 ha to a maximum 1.06 ha ; the average for the country as a whole being 0.11 ha [33] This is shown in Table 1.5.

Table 1.5

State-wise forest area in 1980

State/Union Territory	Forest area (thousand hectares)	Forest area as percentage of total area	Per Capita forest area (hectares)
Andhra Pradesh	6,409	23.15	0.13
Assam	3,071	39.11	0.16
Bihar	2,923	16.81	0.04
Gujarat	1,952	9.96	0.10
Haryana	164	3.71	0.01
Himachal Pradesh	2,119	38.06	0.51
Jammu & Kashmir	2,189	9.85	0.37
Karnataka	3,787	19.75	0.11
Kerala	1,112	28.62	0.04
Madhya Pradesh	15,389	34.75	0.29
Maharashtra	6,408	20.82	0.11
Manipur	1,515	67.75	1.06
Meghalaya	855	38.02	0.66
Nagaland	288	17.42	0.41
Orissa	6,767	43.44	0.25
Punjab	243	4.83	0.02
Rajasthan	3,491	10.20	0.11
Sikkim	260	35.62	1.04
Tamil Nadu	2,179	16.75	0.05
Tripura	593	56.58	0.29
Uttar Pradesh	5,139	17.46	0.05
West Bengal	1,184	13.48	0.02
Union territories → Andaman & Nicobar	714	86.13	3.90
Union territories Arunachal Pradesh	5,154	61.67	8.26
Union territories Chandigarh	Negligible	Negligible	Negligible
Union territories Dadra & Nagar Haveli	20	40.82	0.23
Union territories Delhi	Negligible	Negligible	Negligible
Union territories Goa, Daman & Diu	105	27.56	0.09
Union territories Mizoram	713	33.81	1.46
Union territories Pondicherry	Negligible	Negligible	Negligible
Union territories → Lakshadweep	Negligible	Negligible	Negligible
TOTAL	74,743	22.73	0.11

Source : CSE, 1982; India's Environment, New Delhi.

Even if we assume that the existing fuelwood resources from the forests are likely to be used by the rural communities only, the forest area per person is found to be widely divergent from state to state. Moreover, the transport cost of the commodity will be a determining factor for the consumers to be able to receive it, within their disposable income limit. That is why it will perhaps be wise to discuss the policy issues of firewood supply with due regard to the statewise variation in the resource position.

The other conflicting situation is that the area under forests is not all in proper use; of the total of 75 million hectares, 45.6 million (60%) are in consumptive use.[34] Another 14.8 million hectares (20%) are available for potential use.[35] But here again exploitative and transport costs will be the factors to determine the use of these resources. As most of the unexploitable areas are in the Himalayan belts, the North-Eastern region, and the far off Andaman and Nicobar islands (Figure 1.4) these cannot be used in the near future, due to exploitation cost factors.

The area under forests is in no way suggestive of the quantity of wood resources available in the forests. In fact, it is more important to know about the existing growing stock and the annual increment in growth of the forests, which is otherwise termed as 'Mean Annual Increment' (MAI).[36] These indices depend on various factors, such as nature of forests, crop composition, age of trees, geoclimatic condition, soil types, etc. Despite over 100 years of management practices in the Indian Forestry System, adequate information is not available about the quantities of wood by species, per tree or per hectare (Table 1.6)

The Government of India, in collaboration with the Food and Agriculture Organisation (Preinvestment Survey, 1975), investigated the forest resources in three small selected areas of the country. They have used modern appraisal techniques and concluded that the quantity

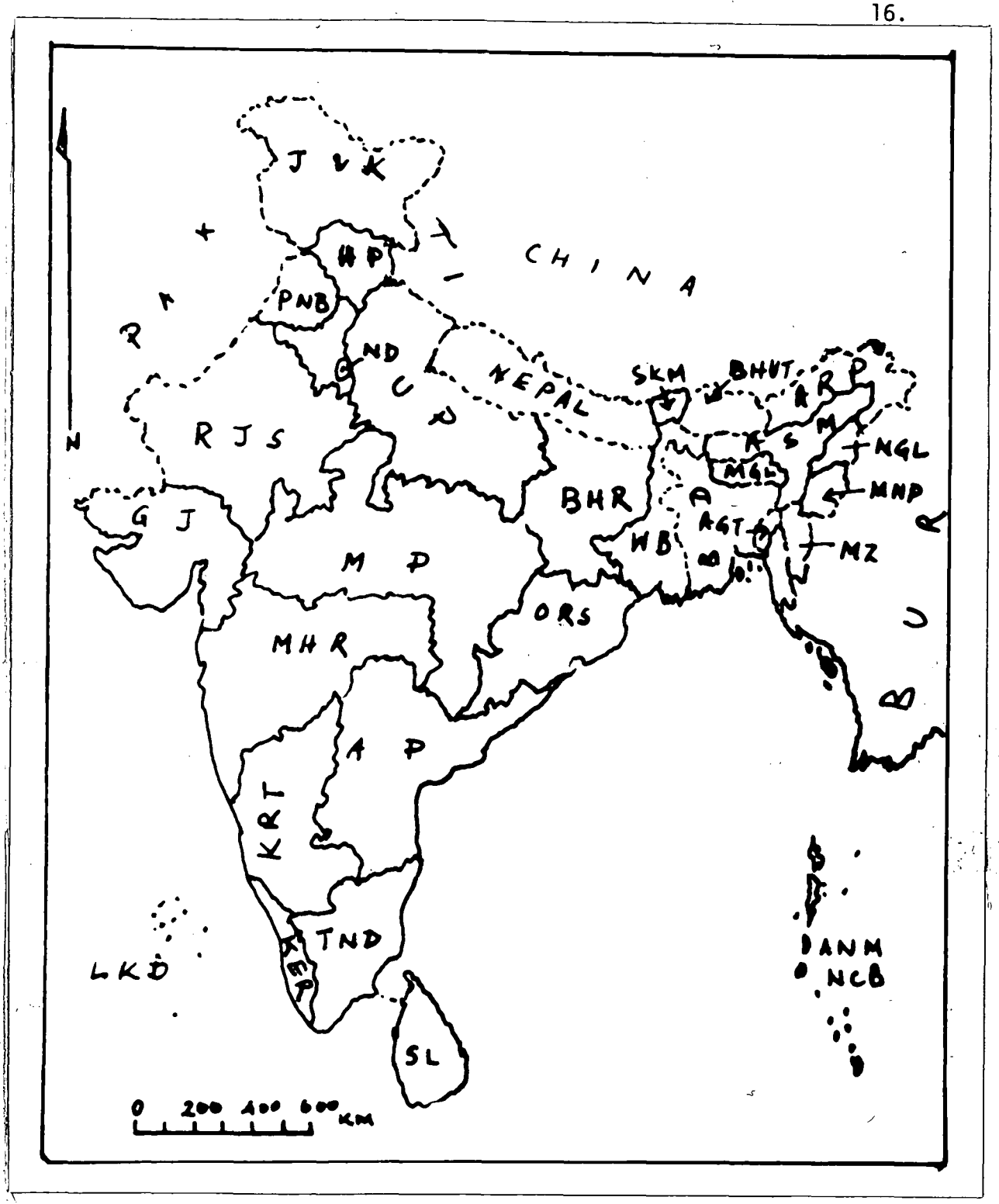

FIGURE 1.4 INDIA : Political Divisions, State boundaries, Union territories, along with neighbouring countries.

Source : Johnson B.L.C., 1979 (India: Resources and Development).

LEGENDS

1. —— State Boundaries
2. --- International Boundaries

INDIA'S NEIGHBOURING COUNTRIES

1. PAK	Pakistan	5. BHUT	Bhutan
2. BD	Bangladesh	6. NE	Nepal
4. SL	Sri Lanka	7. CHI	China
4. BUR	Burma	8. Ti	Tibet

INDIAN STATES & UNION TERRITORIES

1.	J & K	Jammu & Kashmir	14.	MNP	Manipur
2.	HP	Himachal Pradesh	15.	AGT	Agartala
3.	PNB	Punjab	16.	MZ	Mizoram
4.	RJS	Rajasthan	17.	ANM & NC	Andaman & Nicobar Islands
5.	UP	Uttar Pradesh			
6.	MP	Madhya Pradesh	18.	AP	Andhra Pradesh
7.	ORS	Orissa	19.	TND	Tamil Nadu
8.	BHR	Bihar	20.	KER	Kerala
9.	WB	West Bengal	21.	KRT	Karnataka
10.	ASM	Assam	22.	MHR	Maharashtra
11.	MGL	Meghalaya	23.	GJ	Gujarat
12.	ARP	Arunachal Pradesh	24.	LKD	Lakshadeep
13.	NGL	Naga Land	25.	ND	New Delhi

Table 1.6

Estimate of growing stock by different agencies.

		mil m^3	mil tonnes
Forest Centenary Publication	(1961)	1126	901
Indian Forest Statistics	(1969)	2510	2008
Compilation for Commonwealth Conference	(1968)	2611	2089
Estimate by the Planning Commission	(1972)	1722	1382

Source : Pre Investment Survey (1975), Government of India.

of growing stock would be widely differing in different areas, due to inherent crop conditions. This is quite clear from Table 1.7.

Table 1.7
Regional Forest Resources

Region	Growing Stock m^3/ha
Central	65.7
Northern	200.7
Southern	217.4

Source : Government of India, 1975 (Pre Investment Survey)

The growing stock per hectare can be as high as 200 m^3 per hectare, in good forest areas, or as low as 65 m^3 per hectare.[37] The most pessimistic forecast, for the country in general, is an average growing stock as only 35 m^3/ha.[38]

Another important point to observe is that the estimates of growing

stock appear to have been made keeping in view of timber production alone; these have been calculated in terms of volume under bark and exclude the wood from branches. Fuel need could be met satisfactorily from branch wood and bark material, and the growing stock of fuelwood resouces would be higher than the figures given above.

Gross Annual Increment:[39] This is the additional wood produced each year in forests. In general forestry practices, the removal of wood from the existing forest is about the same level as the annual increment; this is known as the sustained yield principle of management. If such extraction is scientifically managed, the stock of wood in the forest should remain undiminished.

The annual increment in Indian forests has not been estimated in a detailed and reliable manner. While the official estimate[40] of GAI (Gross Annual Increment) is about 33.3 million m^3, some experts argue that the actual Gross Annual Increment cannot be less than 60-70 million m^3, in terms of timber wood.[41] The official estimate rate of annual increment per hectare is merely 0.36 tonnes.[42] These estimates seem to be very low compared to dry biomass yields for subtropical forests in countries like U.S.A. where, it is claimed, the average annual increment is about 24.5 tonnes/ha of air dry wood. Other arguments indicate that the Mean Annual Increment of wood might be about 5 tonne/ha in the tropical, 4 tonne/ha in temperate, and 1 tonne/ha in dry tropical forests.[44]

The under-estimation may be the result of the Indian Surveys. While assessing the annual increment, they have only taken into consideration wood under bark and excluded branch wood. The overseas studies include all biomass. It might also be due to the relatively poor stocking of trees in Indian forests compared to those of U.S.A. in similar geographical zones.

Besides meeting the fuel supply, wood from forests would have to

meet the demands of industrial use. The need for industrial wood is only a small fraction of the fuel demand. Table 1.8 shows industrial and fuelwood demand.

Table 1.8

Timber and fuelwood demand relationship.

	In million tonnes.		Projection
	1965	1975	1990
1. Industrial wood	12.7	24.2	32.6
2. Fuelwood	104.0	126.0	250.0

Source : National Commission on Agriculture, Government of India, New Delhi, 1972.

To evaluate the rural energy position it is necessary to know about the fuelwood supply and demand situation as it exists today, and this can be discussed in the next section.

1.3 FUELWOOD DEMAND AND SUPPLY

A peculiar, but important, aspect of the Indian energy situation is the substantial share of 'non-commercial energy'; this has become a permanent feature of India's economy. It has been argued a number of times, that efforts should be made to better manage or commercialise the so-called 'non-commercial' and renewable sources of energy so that they can be used in a more efficient manner.[45]

"Unless the problem is adequately resolved, the energy problem of the rural sector, where it is most critical, is unlikely to be solved and allevation of rural poverty will be nearly impossible"[46] - it is further argued, "while there are many alternatives...the energy requirements for cooking would need innovative solutions to be really cost

effective".[47] Statistics on fuelwood, agricultural waste, and animal dung are scarce; they are derived from computations based on the energy that would be required in rural households.

It is difficult to get information on fuelwood stock available from the forests, or the exact quantities added each year. However, if the published data are reliable, even over the time, say 1990 or 2000, the existing forests could possibly meet the timber needs of the country.[48] As mentioned earlier, the Indian forests' biomass production is considerably lower compared to sub-tropical forests in U.S.A. and, assuming that about one fifth of this biomass (barks, branches, etc.) can be used as woodfuel purposes, the annual yield would be 0.98 tonnes per hectare per annum.[49] On this assumption, woodfuel from forest lands alone will be over 73 million tonnes per year. Though there are trees outside the forest areas also, no systematic attempts at assessment of wood stock from those sources have been made. The available rough estimate is that about 0.97 million hectares of non-forested lands[50] have such potential tree growth outside the forest areas, and the total stock is estimated to be about 30 million tonnes.[51] As the total demand for fuelwood is anything above 250 million tonnes the estimated gap stands to be 250-(73 +30) = 147 million tonnes.

In a poor country like India, there have always been conflicting demands especially on scarce resources, and fuelwood has recently become one such demanding commodity; this is due to several factors such as short rotation resulting quick economic return, less technical skill, labour etc. and subsidised government inputs through social forestry measures.

1.4 CONFLICT OF INTEREST

(i) On Newly generated Resource: Certain conflicting interests have emerged due to commercialisation of woodfuel produce. This is

evidenced by some case studies: "In the city of Bangalore (capital city of Karnataka State, southern India), according to estimates made from weighbridges in the city, about 70 to 80 truckloads of firewood are transported daily from the surrounding rural areas. The total weight of the firewood imported is about 700 tons. About 500 tons of this is Casuarina, a fast growing hardwood, and the rest is made up of traditional species Tamarind (*Tamarindus indica*) Mango (*Manjefera indica*) and Honge (*Pongania glabra*). Except for lops and tops, no Eucalyptus wood is supplied to Bangalore as firewood."[52] The argument about non-availability of firewood to the woodfuel starved rural dwellers has been emphasised: "despite the impressive growth of Eucalyptus plantations under numerous social forestry programmes, the firewood crisis is unlikely to improve. Eucalyptus is too expensive for villages to buy; for the most part, it is sold to urban industries." It is reported that economic interests in plantation crops as farm forestry practices, have drawn larger number of farmers in some areas (Appendix 1.1) in recent times. An income of $1000 to $1600 per acre per annum from irrigated land is feasible, whereas an alternative crop, such as sugar cane, can expect to get a return of only about $300 to $400. These lucrative economic returns have drawn ten thousand farmers, in one district alone, into farming Eucalyptus on their irrigated lands.[54] However, the problem is not growing the products, but one of policy which the Government must resolve by rationalising land allocation in regions or districts, and also in the distribution of the produce. In such decisions, the 'village panchayats' need to hold a key role to regulate the distribution of the produce at the village level itself. Some of these constraints have been discussed in the chapters on socio-cultural complexities, and social-forestry context.

(ii) Cow Dung As Alternative Energy Sources: Many researchers have

attempted to assess the quantity of dung yielded by livestock in India and the proportion of this used as fuel. Among these are: Briscoe[55] (1976); Bhatia & Mehta[56] (1975); Parikh[57] (1974); Henderson[58] (1975); Revelle[59] (1976). Combined estimates range from 120 to 310 million tons per year of dry dung, produced by a cattle population of 300 million, and about 97 million tons of this are used as fuel.[60] The most realistic assessment has been done by Revelle (1976). This gives 56 million tons of dried dung burnt in rural areas. This means 56 kg per capita coal equivalent energy consumption from animal dung.[61] Similarly Briscoe (1976), Makhijani & Poole[62] (1975), Datta[63] (1972), Henderson[64] (1975) estimated energy consumption from crop residues in the rural sector of India, but the most realistic one is also that of Revelle (1976), where it is 32 kg per capita coal equivalent energy from such sources.[65] Fig. 1.5 exemplifies pernicious way of wasting precious animal dung.

In terms of money value it has been estimated that at the rate of 5 tons of wet dung per hectare, about 91 million hectares could be fertilised with the annual dung production.[66] Furthermore, this additional amount of fertiliser could yield a minimum of 5 quintals (½ a ton) per hectare produce, whose total value would be about $4050 million per annum.[67] The present pernicious practice of burning animal dung and crop residues, by millions of the helpless rural poor, is damaging the existing life-support system. Existing circumstances compel the helpless to repeat the process. It is not that they do not know the value of the precious commodity, but they are the mere tools of circumstances.

We have so far analysed part of our problem - why and how forest resource has been depleted and the present short supply and heavy demand arose. We have not yet answered the question, why it has reached so precarious a position? Failure of existing forests to meet rural energy needs does not, in any case, reflect an absence of forestry management

FIGURE 1.5 Animal dungcakes are the commonest source other than firewood of domestic energy in rural India. What a collosus waste!

Source : (Earthscan - Mark Edwards, 1980)

(whose job is more of a technical nature) rather than finding solutions through institutional rearrangement of the system. However, some aspects of this can be discussed in the following:

1.5 EXISTING FORESTRY PRACTICES AND THEIR CONSEQUENCES

As mentioned earlier, the management of fuelwood resources in the past did not receive sufficient attention even though over three-quarters of the population depended on this as their primary source of energy. This could possibly be due to neglect of this sectorial demand so far as energy use is concerned. Even the planners, foresters and administrators remained skeptical about this fact. However, due to growing shortages and spiralling prices, the problem has increased greatly. Attempts are now being made to utilise the knowledge of forestry science and practices for better management of fuelwood resources.[68]

The demand for fuelwood has grown faster than supply. The natural forests are being consumed at a much faster rate than their regeneration (both natural and artificial). As a consequence, the biological capital of forests and soils has been depleted tremendously. The situation has further been aggravated with the loss of about 4.3 million ha of forest land in favour of agriculture and other activities. Table 1.9 shows in detail the forest areas lost during 1951-72, in India (for various purposes).[69]

Table 1.9

Forest Area lost during 1951-72

Purpose	Area (in 1000 ha)
River valley projects	401
Agricultural purposes	2,433
Roads and Communication	55
Establishment of Industries	125
Miscellaneous	388
	3,402*

Source: Forest Resources of Tropical Asia, FAO, 1981.

(* this indicates that an annual loss of about 155,000 hectares)

The primary objective of management of state forests is the production solely of industrial wood. Obviously, fuelwood consideration has been relegated to the background, and always is considered as secondary. Even the country's national forest policy hardly provided any guidelines so far as fuelwood management is concerned. Collection of 'dead wood' or fuelwood from State forests - free of charge by inhabitants or communities located within and around the forest - is another example of avoiding managing the resource in a systematic manner; that is, the management of fuelwood supplies hardly exists. [70]

The reasons for degradation of forests are: failure to meet the basic needs of the rural poor, and the exploitation of forests for urban markets. People living near the forests have been denied legitimate access for satisfying their basic needs - fuelwood, building, fodder, etc. They have had to resort to illegal and unorganised fellings or overgrazing.

The major blame of deforestation lies on the management policies of State forest departments. One argument is that in India forests have never been reserved for the people.[71] The origin of the current crisis may be sought in the long-drawn, short-sighted forest policies continuing from the British period. The only interest the former overseas rulers had in Indian forests was in earning revenue. Unfortunately, even after independence the same commercial outlook remained unchanged in the forest departments. Table 1.10 shows that during 1980-81 India earned $464 million from its forests with five major States (Madhya Pradesh $139; Maharashtre $52; Karnataka $46; Kerala $31; and Orissa $25) accounting for 64 percent of this revenue.[72]

The State forest departments, however, do not accept this argument, pointing out that they follow "Working plans" or management plans chartered by specialised leading foresters on scientific tree felling.

TABLE 1.10

State-wise contribution of forest revenue in 1980-81.

STATE	REVENUE (million rupees)		Percentage contribution of forests
	All Sources	Forests (expected)	
Andhra Pradesh	109.288	2.609	2.38
Assam	30.373	1.125	3.70
Bihar	87.465	1.471	1.68
Gujarat	94.750	1.128	1.19
Haryana	43.332	0.159	0.36
Humachal Pradesh	19.288	1.616	8.37
Jammu & Kashmir	22.573	1.878	8.31
Karnataka	91.244	4.600	5.04
Kerala	59.129	3.178	5.37
Madhya Pradesh	111.488	13.944	12.50
Maharashtra	192.197	5.220	2.71
Manipur	8.456	0.024	0.28
Maghalaya	6.636	0.088	1.32
Nagaland	9.543	0.050	0.52
Orissa	53.690	2.521	4.69
Punjab	54.472	0.404	0.74
Rajasthan	71.659	0.651	0.90
Sikkim	3.501	0.032	0.91
Tamil Nadu	98.266	1.125	1.14
Tripura	8.555	1.125	13.15
Uttar Pradesh	162.234	2.030	1.25
West Bengal	112.373	1.423	1.26
TOTAL	1,450.518	46.401	3.19

Source : The State of India's Environment, 1982: A Citizens Report (CSE New Delhi, 1982).

Contractors are supposed to remove trees only according to working plan prescription - which normally allows only the incremental growth of the crop to be felled without detriment to the growth potential of the forest. The foresters, however, it is argued, conveniently forget to point out that this works only on paper. Public opinion is that huge sections of the forest are lost due to illegal felling and this could never be included in the management plans.

Since independence, a number of forest-based industries have emerged and forestry practices have become linked with the consumption demands of these industries. In earlier sections we have examined how, due to population growth and associated demand factors, the industrial wood demand has increased and is continuing to increase. To meet this short-fall forest departments have consistently overlooked the rural demand of forest products. Not only that, in order to keep the rural community away from the forests, a kind of police attitude has been generated within them. The recently introduced *Forest Bill*[73] can be cited as an example of such mechanism (Appendix 1.2).

To sum up, it may be worthwhile noting the following remark made by an Indian environmentalist recently - "the local population is not bothered about preserving forests because it earns more if it steals the wood instead of working for low wages. The industry is interested only in immediate profits; the forest bureaucracy has neither responsibility nor accountability".[74]

1.6 DISCUSSION AND CONCLUSION

Due to the present desperate situation of fuelwood shortage, the possibility of generation of economic prosperity for rural communities, and improvement of ecological conditions of the areas, there are enormous possibilities for the solution of this problem. Answers to the simple questions of planting trees have been sought through newly envisaged programmes known as *Social Forestry*.[75] These bring some hope to the solving of rural energy problems.

Planting trees is not considered much of a technical problem. The identification of suitable land areas may not be much of a problem. Even the financial constraints can be overcome (Appendix 1.3) through overseas assistance. Choice of suitable species (Appendix 1.4) may not be difficult. All these problems are within the techno-administrative

realms and can be resolved through managerial capabilities. But the real problem lies elsewhere.

Woodfuel generation for the rural communities of India is not simple. The problem is intractable with many complex factors and divergent interests prevailing within the rural social system. Apparently the Indian social system looks unified (known as *unity in diversity*) but it is riddled with very many conflicts and these are as old as the Hindu society itself. This is why the topic must be discussed in the background of rural socio-cultural diversities and complexities.

As mentioned elsewhere, modern society's problems cannot be discussed without its energy use pattern; so also the rural energy problem cannot be discussed without knowing the inherent socio-cultural complexities and these are institutional problems of rural communities of India.

In the next chapter we shall consider how, even if the scientific, technical and economic problems can be solved, it would not be sufficient to ensure adequate fuelwood supply to all who need it. The rural complexities are analysed insofar as they are likely to affect the outcome of new woodfuel supply policies.

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2 SOCIAL, CULTURAL, POLITICAL, ADMINISTRATIVE COMPLEXITIES

CHAPTER TWO

2. SOCIAL, CULTURAL, POLITICAL AND ADMINISTRATIVE COMPLEXITIES OF RURAL INDIA.

2.1 SUMMARY - OBSERVATION:

The problem of woodful production in the rural sector of India has been emphasised in the earlier chapter. The present chapter deals with certain sociocultural, traditional and rural political complexities, which share the major attention of the present study. The supply of woodfuel apparently looks simple; but, due to certain complex factors interacting within the traditional social order, it is not so. India has inherited various contradictions and divergent attitudes which should be considered. It is necessary for our purpose to know of the various complexities existing within rural communities, their traditional and cultural patterns and the mode of interactions between the different rural communities and village groups. Not only that, the source of power of the present political system has its roots in over half a million villages of India. This factor is very important for our study; before formulation of policy issues it is necessary to know for whom the woodfuel resource is to be built up. As mentioned elsewhere, the objective of the present study is not to examine tehcno-administrative possibilities either in silviculture of the species suitable for plantation or any other innovative research approaches so far as energy combustion is concerned.

There are various interacting forces operating on the tradition-bound rural village system and each of these has a role to play in shaping and building up one of the most vitally important resources for the rural communities.

One thing is common: everyone, high or low, rich or poor, Hindu or Muslim, needs firewood for cooking meals. Despite this being everybody's common problem, they still cannot patch up internal differences amongst themselves.

Indian society has evolved through the ages despite these internal discordant and diverging attitudes, but today it is a question of survival of this civilization - and rural energy supply is the centre of such problem.

2.2 RURAL SOCIAL SYSTEM:

As mentioned earlier, our problem is to examine the possibilities of generating wood energy resources for about 80% of the Indian population (about 550 million). It is important to know about the pattern of social structure of so large a population and the mechanism which decides or resolves various decisive activities within the village system. Within each village the basic ingredients are different caste groups; these are permanent in Indian Hindu society.[1] There are four basic caste components within the Hindu society and the caste hierarchy becomes a determinant in deciding the most important and basic issues. Obviously the superior caste groups by virtue of their special position in the village community, develop a superiority complex and dominate and regulate the village's affairs.

The caste barrier and its complexities have become the main cause of many social problems. Many times, an innovative programme may be techno-administratively and scientifically feasible, but may not be acceptable to the village society, as it cannot be fitted into the cultural and tradition-bound outlook of the rigid orthodox Hindu society.[2] The newly established community biogas systems could not become successful because of opposing forces which were generated

within the community and different caste groups.[3] It appears sometimes, completely hypocritical that despite India's constitutional acceptance of casteless and creedless society (major requirements for reaching an egalitarian society) there have been so many contradictions in most of the developmental activities whose major objectives were to satisfy the community goals and aspirations. The Hindu 'caste cliques' and 'caste conflicts' are the major dominating forces which, in many cases, have destroyed village improvement extensions works.[4]

The removal of the 'caste clique' and minimisation of socio-religious barriers between various groups is not easy. However, despite all these complexities, the rural village system of India has come through over 5,000 years and has overcome many odds during its evolution to its present form.[5] It is likely that any radical approach to changing the existing caste system in the village system of India is futile; perhaps the only major breakthrough in the caste barrier will be effected in a slow but progessive manner, by introducing modern amenities.[6] Certain other very important components of the rural system deserve special attention and these should be discussed.

2.2.1 Rural Family

The basic unit of Indian village social structure is a household consisting of a husband, a wife and their children. Within the household, all members share in the work of the family and all members are considered as co-owners of the family property. Normally, in an agricultural family, the husband and the older male children carry out the farm work while the wife and the elder female children manage the household.[7]

2.2.2 Housewife's Role in Wood Energy

It is an accepted fact that women hold a very key position to determine the various socio-cultural and traditional values of the

Indian rural system. Until rural women are activated to participate in this vitally important national issue, action by the menfolk may be only partially successful.[8]

The most important work of the housewife is to prepare food for the rest of the family. She is therefore directly involved in the collection, preparation and use of woodfuel for cooking. She plays a very important role in determining its use, time of collection and even suitability of the species useful as fodder for domestic animals. Despite her direct involvement in the rural energy use, she has hardly ever been consulted in tree planting programmes or any other innovative approaches. The introduction of new technologies into the rural areas of the Third World has always been a difficult proposition.[9] Innovational technologies like biogas plants, fuelwood plantations, fuel-conserving, smokeless "chullas" (woodstoves) etc. need the rural women's, especially housewives', fullest involvement; they are the real sufferers for want of these things. Scientifically, technologically, or even economically acceptable proposals may not be socially acceptable, rather they add further to the already heavy burdens of the rural woman.[10] Others contend that the real benefits from innovative technologies cannot percolate through the rural village system unless women are organised or organise themselves, to assert their interests.[11] India, no doubt, has advanced sufficiently in the establishment of socialism, but she is still a very poor performer in establishing feminism. However, if there is will, and if they are well organised, even the illiterate women can be active and participate in some important decision-making processes. A unique case study, known as "Indian Chipko Movement" - or tree hugging, can be referred to in this context (Appendix 2.1). This movement has brought out some basic questions:[12] Whose needs should forest resources serve, people

who reside in and around the forest, or those who are far away, living in cities?

For cooking meals every day, and for other household uses, the supply of firewood is an everyday task for women to deal with (Fig.2.1).They cannot escape the stark realities of woodfuel shortage and its consequences. The survival of children, husbands and other family members depends upon securing this precious commodity within a reasonable distance. It is interesting that, while men's disinterest or callous attitudes may delay innovative technological schemes, women's interest can keep projects moving. This could be exemplified by "while the men have lost their curiosity and interest, it is women who keep asking us when will the plant start. The special interest amongst women has come to us as a great surprise".[13]

The wood energy generation process is deeply enmeshed in the rural social system, and how various factors are interacting around religio-traditional,cultural and other related systems is discussed in the next section.

2.3 RELIGIO-TRADITIONAL AND CULTURAL COMPLEXITIES:

It has been said that the Indian culture is "beginningless" in the sense that it is impossible to identify when it originated. This does not mean that the Hindu culture did not have an origin. It developed because Hinduism is a *culture complex*,[14] not a founded religion like Christianity or Islam. The emphasis on tradition is so permanent in Indian culture, that sometimes even baseless cultural or traditional ritualistic practices get preference over scientific ideas or facts. Our objective here is to show that India, at the present time, has been completely divided into two separate divisions - her traditional, culture-bound, religious framework, based mainly in the rural sphere, and the modern and industrial urban elite as the other part. There is

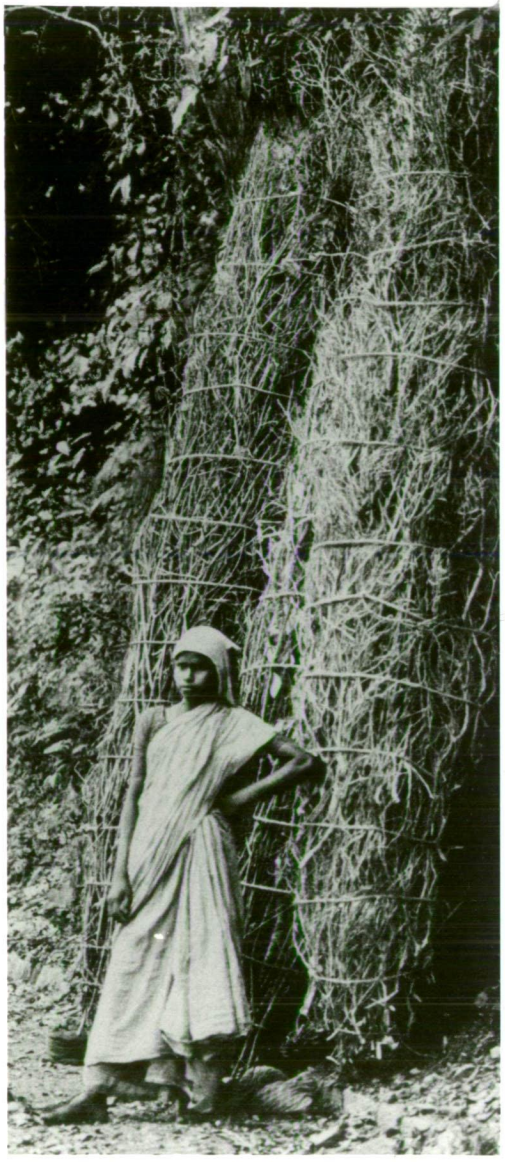


FIGURE 2.1 Firewood collection is a daily routine work of the rural housewife.

Source: Centre for Science and Environment, New Delhi, 1982.

an almost unbridgeable cleavage between these two separate systems. It is important for us to know the basic characteristics of these two cultural complexes, because the major policy decisions are framed by the administrative 'sub-culture', a part of the urban elites. Policy decisions framed in the cities will decide the fate of millions of less fortunate Indians.[15]

Indian peasants are not stupid because they live in villages or because they have certain habits and circumstances which urban dwellers have rejected in favour of something better.[16] We must admit that the peasant has a different set of perceptions and a different set of values, with which he is at least content.[17] The cities are seen as discordant, as soulless, as attempting to disrupt, or at least to alter the traditional pattern of harmony, and as divorcing themselves from nature.[18]

Religious and philosophical concepts are a very important aspect of Indian life - a most important part of her culture. Religion is not something which is normally separable from the rest of people's lives. Although rituals are very important in Indian life, and these have become almost part of the social systems, the metaphysical and philosophical inner reality is more important.[19] Indian tradition is as old as human civilization.[20]

India has enormous staying-power and is not going to disappear. Certainly one of the most exciting aspects of the world today is the effort of this ancient culture (about one sixth of humanity) to come to terms with itself and devise its own distinctively Indian solutions.[21]

The static village, whose life centres around the age-old traditional and religio-cultural values, is on the move. The rural countryside is clamouring for urban amenities, and the old fatalistic beliefs and attitudes are being shaken up.[22] Despite the various limitations

there is a trend towards the search for new values. The old beliefs and practices are being questioned and often are readily discarded.[23] This is more often noticeable in the city or urban cultural spheres. What is needed today is that the new intelligentsia play a very decisive role in shaping and directing rural communities. The answer lies in achieving a dynamic and creative synthesis of tradition and modernisation through an appropriate type of education suitable for the rural society. Education plays a vital role in the efficient utilization of resources, in changing the public ethos, for participation in public policy issues, and in the community's ability to interact in a meaningful manner.[24] The quality of education amongst the village communities will determine the public participation in important issues on which their survival depends. But the quality of village leadership will determine the community's total perception of problems.

Woodfuel generation has much relevance to the rural community's all-round affairs. The issue is so serious for both national and local socio-political levels that public participation has become an important instrument in shaping the issue in right directions. We should examine the problem from the viewpoint of the existing social systems and their cultural complexities, which are part and parcel of the Indian rural communities. It has been said that India's village system is a 'complete mosaic' of human existence, and that it represents all forms of possible human complexities, but in a more simple way of existence (as far as energy use is concerned). In one way, the system is so stable, that it may need totally radical approaches for any perception changes, whereas it may be absolutely fruitless to introduce such changes, without first making changes in the socio-cultural practices and decadent social norms.[25] Above all, the development of public pressure for such tradition-bound village

societies as those in India, requires a real psychological revolution;[26] for obvious reasons, this is beyond the scope of our observation. However, the other most important element of our discussion, the Indian political system which determines all major policy issues, needs special attention and this can now be focussed upon.

2.4 RURAL POLITICS AND CASTE CONFLICTS

Villagers, normally, are less active and less interested in politics than urban or city dwellers.[27] The nation's political scene is dominated by city people, though the rural communities do play some important roles. Villagers played significantly important roles during the freedom movement of the nation, and it is natural that they should participate in national politics after independence.[28] As mentioned earlier, the politics of India revolve round religio-caste complexities. It makes no sense without carefully considering the all-pervasive influence of religion on village life. It has become an accepted fact that any shrewd politician in India, regardless of his own religious convictions, must be able to identify the existing caste structure within his constituency, so that it becomes possible for him to capture the support either of the dominant caste or of a majority of those who oppose them. Table 2.1 shows the different religious groupings in India; but in the Hindu religion, which is the majority, there are four basic groups which determine village politics. These basic caste groups are: Brahmin (priest), Kshatriya (warrior), Vaishya (merchant) and Shudra (worker), arranged in order of the social hierarchy.

Within the major religious grouping (Hindu), there are inherent caste conflicts, centering around the major four castes and leaving aside basic disharmony between the different major religious groups

Table 2.1
India's Population by Religions

Religion	Number (in millions)	% of the total population
Hindu	581.0	83.0
Muslim	77.0	11.0
Christian	17.5	2.5
Sikh	14.0	2.0
Buddhist	5.6	0.8
Jain	3.5	0.5
Others	1.4	0.2
		100.0

Source : Johnson, B.L.C., 1979, India : Resources and Development.

within village communities. One of the reasons for a lack of unity among the poor is the social chasm that exists between the lowest castes (outcastes or scheduled castes) and the higher castes (caste Hindu) within social groups in rural communities.[29] It is a fact that the untouchables (the lowest Hindu caste groups) are shunned by the Brahmins (highest caste groups). The traditional antagonism is further accentuated by the fact that, in most cases, the Brahmins (or the other higher caste groups) are landowners or 'landlords', while the untouchables are share croppers or agricultural workers. The chronic alienation between different caste and religious groups is best seen in the 'village panchayat'[30] or general election. The power in village politics revolves around the dominant caste or religious groups.

In practice the political parties are guided more by pragmatic considerations, rather than high-sounding official policy. While selecting party candidates for election, they consider these points:

Is the candidate a local man? If so, how widespread is his personal and social network? How does his caste or religion (in the case of a non-Hindu) relate to the caste and religious composition of the constituency? How experienced is he in public and electoral affairs? How effective is he in dealing with government officials? And, most importantly: how large are his financial resources?[31] The significance of the caste origin of a particular candidate is not surprising. It is because there is lack of a genuine political consciousness among rural voters who, in most states, form the bulk of the electorate; in such a situation, the caste factor becomes a natural rallying ground for the electors. Caste loyalty is a common thread between the politics of a village and those of a rural constituency in a state assembly. In extreme circumstances, when for example, candidates of different parties belong to the same caste, the size of their financial resources often becomes the deciding factor in election results.[32] "High caste, more land, more money and more education continued to be the ultimate determinants for political success."[33] Money, power and politics are interlinked and their inherent strong bondage can hardly be removed from the Indian rural social system. Almost all these factors have become permanent in the socio-political complexities of rural community life.

The rural leadership has an important role to play in creating various types of organisations and in directing the rural community in right perspectives and developmental programmes. The problem of leadership in a diverse society like India is a complex one. In a democratic society the village leaders are not bound by the plans and policies of the political parties, as in the centrally organised (communist) system. In a backward country like India, the leaders have not only to take the community forward but at the same time to

act to protect the weaker sections of the society.[34] The village leaders must understand their responsibilities in rural energy problems (which obviously are associated with so many socio-cultural, traditional, caste complexities). Only then is there any possibility of evolving correct policy decision. It is obvious that, without policy decisions about where the resources are to be grown, who is to share the produce; and how much is to be shared of this resource by different community groups - the whole process of woodfuel generation may lead to futile action. The problems are in the villages; it is the duty of the village leaders to identify the nature of the problems and to suggest measures for their solution.

It is, however, relevant how the rural administrative system is involved in the process of woodfuel generation, and how the various components of this system interact. These can be considered in the next section.

2.5 RURAL ADMINISTRATIVE PATTERN AND ITS STRUCTURE

India has, from the British system, inherited an excellent administrative service. The old Indian Civil Service was a model to the world.[35] A new Indian Administrative Service (IAS) has been built since independence to take the place of imperial administration. There is a long tradition in India of a clear separation between the politicians who make policies and the administrators who execute them. With the concept of welfare state objectives in India, and with enormous intervention by government into the socio-economic life of the country, technically qualified administrators are having more of a say in determining or shaping policy decisions.[36] Indian politicians, like any other politicians in the world, are not capable, in a highly scientific and rapidly changing age, of solving some of the many complex

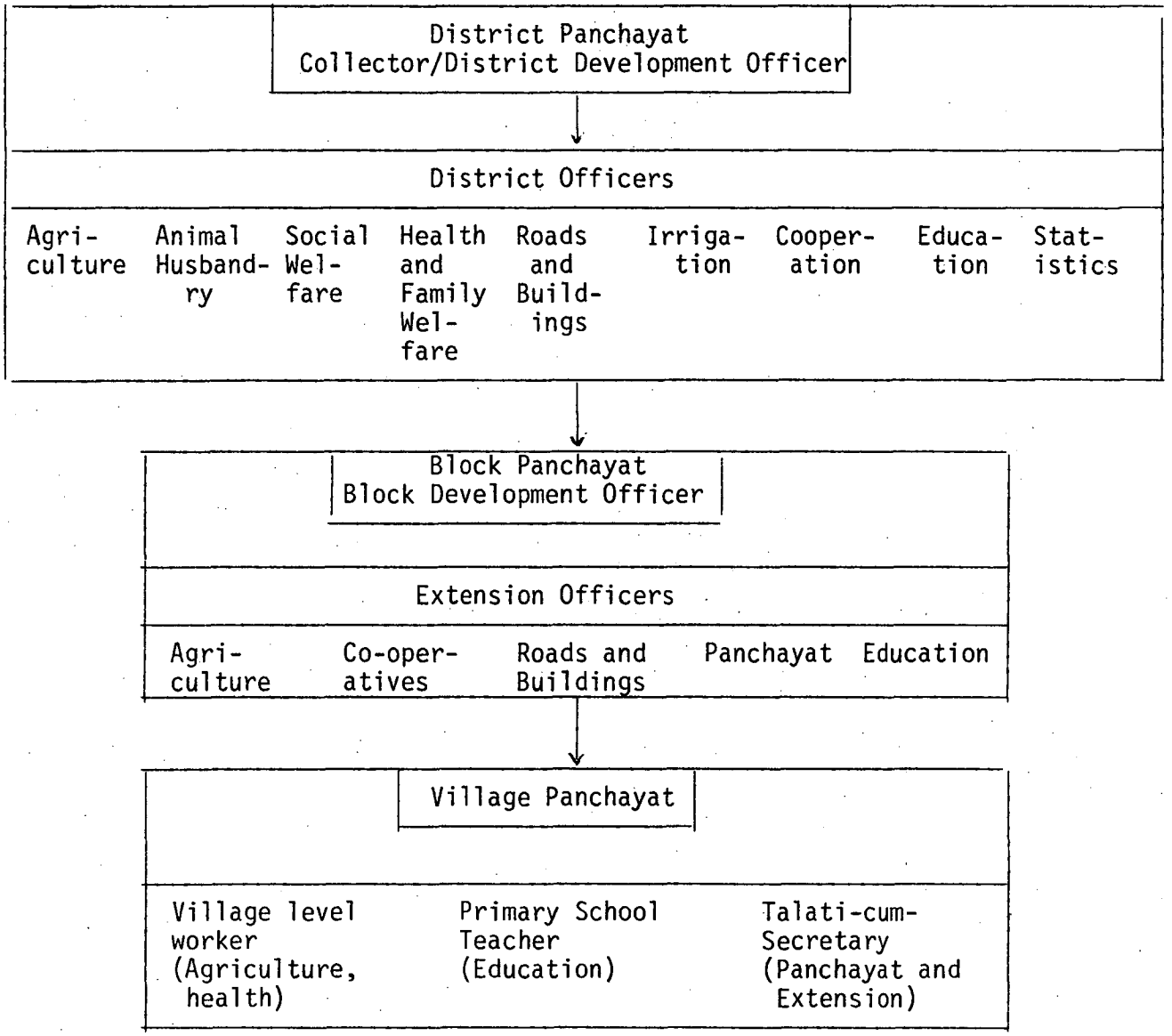
issues they face. As a result, the administrative intelligentsia within the bureaucratic system get the opportunity of assuming greater responsibility in political decisions. However, criticism of bureaucracy (for its expanding role in public policy-making) is quite prevalent in India. In general terms, the upper levels of Indian administration are of a very high quality, probably as high as any bureaucracy in the world.[37]

Returning to the administration at village level, this can be resolved into a three-tier system: the lowest level is the village unit; the highest is the district; and, between these, there is the development block. At the village level there is a 'panchayat' (council) which is a body of various interest groups within the village. This is an important component of the present decentralised system of administration and it will be discussed in more detail, in connection with rural development and in the social forestry context. The 'development block' which is at the middle level of the rural revitalisation programme, has to take the major responsibilities for development work. Above the development block there is the district administration and this is the co-ordinating body between the government and the various executive units within development blocks. The administrative linkages between and amongst the district, block and village levels (with the local level arrangements, e.g. Zila parishad, Block Samiti, and Village Panchayat[38]) are shown in Figure 2.2.

In the present local administrative arrangements (through the decentralised local level participation of elected village, block, and zila parishad leadership) wide responsibility for economic development has been given to illiterate and politically-inexperienced villagers.[39] It is feared that the world of professional administrators - passing through the hierarchy of government from centre to state

FIGURE 2.2.

ORGANIZATION OF DEVELOPMENT ADMINISTRATION AT DISTRICT, BLOCK AND VILLAGE LEVEL.



Source : Kaul, M., 1980; Reference 49.

(Figure 2.3), and to district - may be negated in the hands of local bodies.[40]

In each district headquarters a senior administrative officer of the state, recruited by the federal government, is appointed. He may be known variously as the Collector, the District Magistrate, or the Deputy Commissioner. He is the administrator and co-ordinator of all governmental policies (state and central) that have relevance within that district. He is a powerful figure; his job is to untangle administrative confusions. Because of the new approach to decentralised administration through local elected bodies, he also has to bear additional responsibilities, as district development officer. The success of any new social and economic programme depends upon the calibre and dynamism of this key person. Despite all the experiments in politics and administration, the District Officers remain the mainstay of governmental stability in rural India.

The tradition of Indian administration, over centuries, has been that government at all levels conveys orders.[41] The concept of the 'public servant' in its broadest sense has hardly existed. Customs, however, may change slowly. It is interesting to see how the system operates in a typical case: "In daily working the civil servant exhibits few of the signs of a public servant. In most offices, the official transacts business as if he is conferring a boon, a favour on his client. Even a ration card is looked on less as a right of the citizen than almost as a gift of the administration".[42] It is, however, difficult to apportion blame for this between officials and the public. The attitudes, values and pressures on both sides interact in a situation where no positive outcome can be obtained and the spirit of public service is totally defeated. There may be some exceptions, but it is a fact that India has yet to catch up with the idea or reality of the

public service. The citizen of India has a long way to go to make his government more 'service-minded'.[43] There is an imperative need for people's participation in policy-framing procedures; without such activities (public debate, etc.) it is difficult to sensitize the bureaucratic system.

India in recent times has, in various ways, tried to improve the rural administrative machinery. The main objective is to improve the lot of the "poorest of the poor". Some of this recently adopted approach can be discussed in the next section.

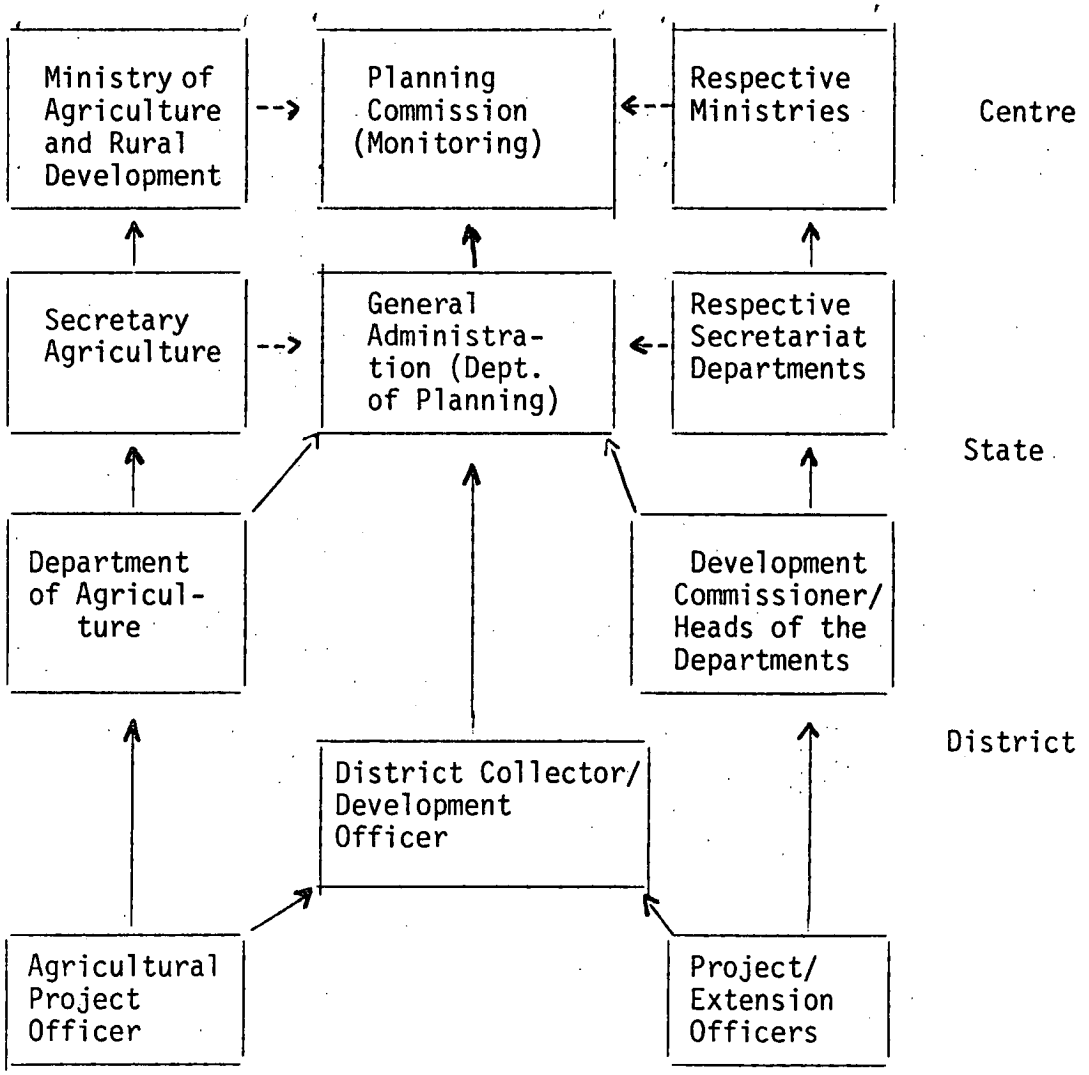
2.5.1 Integrated Rural Development : Concept and Genesis

The current five-year plan (the sixth, 1980-85 plan) lays stress on the mobilisation of local and human resources and intensification of local planning.[44] This concept reflects a commitment towards people's participation in the planning process. There has been a reversal of the traditional model of 'planning from above' and an emphasis has been laid on grass-root planning. This is, no doubt, considered a radical shift, with economic, political, and social implications.[45]

The concept of block level planning has been accepted in principle by all the states of the country. In 1977, the Ministry of Agriculture and Rural Reconstruction directed the state planning machinery to prepare plans at block level and this was inaugurated in April 1978. (Figure 2.3 shows the linkages between the Centre and States.) There are 5004 blocks in the country, and the block level planning is to be introduced in 3500 (70%) blocks during the current plan period.[46] Of these, 2600 blocks have been covered by the Integrated Rural Development (IRD) programme.[47] Block level planning is the most significant programme introduced into the country's current plan periods. Obviously, it anticipates radical socio-economic changes, in terms of demographic and geographic coverage of the country.[48] The other important and

FIGURE 2.3 REPORTING LINKAGES

BETWEEN STATE AND THE CENTRE ON IRD PROGRAMMES



Source : Kaul, M., 1980, Reference 49.

significant aspect of this concept (Integrated Rural Development) is considered a process of development which should originate from the people, as opposed to centrally planned national development which originates from the planners in the capital cities.

How Integrated Rural Development Programmes are planned; what are their objectives; and who are intended to receive the benefits of such schemes - can be discussed in the next section. It is necessary to understand these programmes since intended woodfuel development must be fitted into them.

2.5.2 Integrated Rural Development: Operational Strategy

As has already been mentioned, rural development is recognised as a strategy to improve the economic and social life of specific groups of people, the rural poor. To ease the states' financial constraints, the Federal Government has raised the share of subsidy to about 43 percent of total public investment.[49] The present rural development policy has been conceived with the consequential outcome of evolutionary processes from Community Development, Panchayati Raj, and lastly, the Integrated Rural Development. This we have dealt with elsewhere. However, one common operational and institutionalised organ, the block unit, has been kept as a permanent functional body. This is headed by a civil servant, the Block Development Officer. The operational unit of a block consists of about 100 villages with population of 60-70 thousands.[50] The programme focusses mainly on the provision of inputs and on the functional integration of specialised services from various departments: health, education, agriculture, industry, forestry, etc. (Figure 2.2). The inputs to be provided include seeds, pesticides, implements, machinery, credit, marketing, and storage facilities. The Village Level Worker is the link between the village and the block.[51]

It may be relevant to mention a few of the specialised programmes operating under the IRD schemes during the fifth five-year plan period; these are still in operation in the current five-year plan. These projects are aimed at development of specific areas, taking into consideration the local resources (including human resources). The Tribal Area Development Schemes, Drought-Prone Area Programmes and Command Area Development Programmes,[52] are some of these. According to Ministerial documents, "Integrated Rural Development focusses on the integrated development of the area and the people through optimum development, utilisation of local resources, physical, biological, human, and by bringing about necessary institutional, structural changes and by delivering a package of services to encompass not only the economic field, but also the services like health, nutrition, sanitation, drinking water and literacy with the ultimate objective of improving the quality of life for the rural poor".[53] The other relevant aspect of the Integrated Rural Development programme is that it encompasses various agricultural projects, supplemented by cattle development schemes, agro-industries, small scale industries and various other labour-intensive industries. Some of the schemes include forestry, wood processing and fishery projects. The aim of these schemes is "social justice, achievement of full employment in the rural areas in a period of ten years, and removal of rural poverty".[54]

The main thrust of the IRD programme is taking the benefits of economic development to the weakest and poorest sections of the society. Emphasis has been laid on selection of special programmes which will assure additional income and provide continuous employment to the beneficiaries or target group. It is considered necessary for decentralised planning to be at the block level.[55] It is necessary for the present strategy to intensify efforts on block level integrated rural

development programmes. The aims of all these programmes are no doubt good and designed to uplift the socio-economic condition of the rural poor. But various factors operating within the system stand against reaching the desired objectives. Some of these we have already discussed; a few more could be discussed below.

2.6 DISCUSSION

"The primary objective of Panchayati Raj is to enable the people of each area to achieve intensive and continuous economic benefits and prosperity in the interest of the entire population. The elected representatives should be encouraged to value the development of Panchayati Raj as offering new avenues of service to the people rather than opportunities for the exercise of authority."[56] The major objective of democratic decentralisation, which has been institutionalised as Panchayati Raj in India, is to create the devolution of power to the people, who (at local rural levels) had no access to authority and power in the past. The idea originates from the theme, that those who govern themselves govern the best.

In actual practice, the present Panchayati Raj system has developed certain undesirable consequences; for instance, non-officials are becoming rather sensitive about their sphere of power and authority. The Panchayati Raj institutions are becoming the centre of power and politics at the village level: "Wherever there is power there must be politics".[57] The average villager does not want politics, but he has to indulge in it; otherwise he finds himself limited in manipulating power, under the aegis of Panchayati Raj. These processes are evident when there are elections through which the village panchayat members are elected.

The other important element of this institutionalised system is the administrative sub-culture, the bureaucratic elite with an urban

socio-cultural and educational background. The administrative elite, in charge of affairs, finds the rural surroundings uncomfortable due to the lack of physical and educational facilities in the Indian villages. Their bookish understanding of the rural complex, their inherent detached sympathy for the illiterate, semi-clothed and ill-fed villagers, along with language communication barriers, put them in a peculiar position. Because of their higher educational background, socially higher parentage and their placement as the established administrative authority, there is an enormous temptation to develop a superiority complex. This can stand in the way of their coming close to the villagers and being failures as grass-root level administrators.

The civil servants attached to the Panchayati Raj institutions find it difficult to reconcile themselves to accepting the village-born non-officials as their political bosses.[58] The inherent tendency of these complex socio-psychological barriers developing between the two groups needs to be recognised. It generates tensions between the major functional elements in the system, and obviously negates some of the creative impulses of the individual functionary in the rural development system. The author, while working as a Divisional Forest Officer in Bangalore, experienced bitterness between the different structural components of the Panchayati Raj system on many occasions.[59]

Local politics in some cases accentuate factionalism and divide the Panchayat Samiti into majority and minority groups. The worst part of it is when the majority group tries to monopolise all the benefits, and places the block administration in a very difficult situation. On the other hand, the minority group expects the administration to play the neutral traditional arbitral role; if this is done the administration may clash with the political bosses. In extreme cases the involvement of the Panchayati Raj leaders in politics becomes so deep

that they hardly have time to concentrate on developmental activites for the community. Another factor is that the local leaders forge links with the state leaders; the state leaders realise that, to get rural votes, it is important to win over Panchayat leaders and, in the process, Panchayat Raj becomes a 'Vote Bank' for political purposes.[60] In a similar manner village co-operatives become part of local power struggles and the same groups control both the village Panchayat and the village co-operative.[61] Another interesting observation may be mentioned in this connection. Gangrade (1974) concludes, "the hold of traditional leaders is complete. These leaders represent the propertied and privileged groups in the village society."[62]

The Indian village society, as we have seen earlier, is not homogeneous in composition. Within the village, there exist several groups which are caste-riddled and economically fragmented; the interests of agricultural labour are different from those of the tenants or share-croppers and they may come into conflict with one another. The landowners and tenants are interested in keeping agricultural wages as low as possible; they wish to raise their share of produce from their land; sometimes, with flimsy pretext, they eject the tenants. The big landlords, being money-lenders, oppress all other classes in the village. The existing rural organisations help the richer classes to strengthen themselves. The emergence of a new 'elite peasant class' due to the 'green revolution' hardly serves any purpose for improvement in community life as a whole in the rural area. The benefits the rural poor receive from all these programmes are little more than cosmetic. They are left out of developmental benefits, and the institutions created for them have been captured by the entrenched classes to serve their interests alone.

2.7 CONCLUSION

Though the real issue is political and is concerned with total developments of the rural community as a whole, the socio-economic bias of power has to undergo drastic changes to meet the genuine needs of the peasantry. Some of the weaknesses that we have tried to analyse are associated with the organisations themselves, while others drive from the socio-political, economic and rural environmental complexities of Indian village systems.

Mere evolution or institutionalisation of Panchayati Raj, for the purpose of uplifting the Indian village system, is not the end of it. Furthermore, in the context of democratic decentralisation and on the Gandhian principle of self-sufficiency, an all-round improvement of the Indian village unit is not only necessary for survival, but for the full expression of the community's ethos. The rural development concept, no doubt, is a dynamic one, but whether the present approach is the only way to produce goods and services down to the poorest of the poor, only time will tell.

Added to the many existing rural problems the present firewood shortage has further aggravated the rural people's misery. Both food and wood are the two most essential commodities for the rural people's survival; the first one is beyond our discussion. The solutions of the second problem we can concentrate on in the next chapter. In particular, we shall look at the central idea of "Social Forestry"[63] as an answer to the problem and at the difficulties which it must overcome if it is to succeed.

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63. Social Forestry: Rearing, managing and utilising tree crops for the benefit of rural communities, especially to satisfy the energy needs, food requirement and other purposes.

3 SOCIAL FORESTRY CONSTRAINTS

CHAPTER THREE

3. SOCIAL FORESTRY CONSTRAINTS

3.1 SUMMARY OBSERVATION

Along with the present acute shortage of fossil fuel base energy supply there developed another internal fuel crisis in the rural sector of India. This "second energy crisis", though non-commercial in nature, is seriously affecting three quarters of the population. The solution of this problem is being sought through Social Forestry, a new concept. This chapter emphasises that present Indian Social Forestry needs an attitudinal-dimensional change from the existing traditional forestry practices. A few important constraints foreseen as initial barriers against the establishment of Social Forestry have been discussed. More detailed examinations are dealt with in the chapter.

3.2 SOCIAL FORESTRY - WHAT IS IT?

One solution might be to develop new forest societies outside the commercial forests; that is, to involve millions of people throughout the countryside in growing trees to meet their own requirements, as well as involving them in the protection of the hitherto degraded land resources on which their surivival depends. Indiscriminate woodfuel collection is one of the major forces in the destruction of the existing native forest systems and this problem can be alleviated only with the creation of woodlots or farm forests on accessible sites. This should result in the relieving of the pressure on natural forests by supplying woodfuel more conveniently from this newly created resource. Rural areas have the potential to supply their own woodfuel

from small local plantations within or around the village boundaries where woodfuel can be produced and managed like any farm crop, without much government intervention. This would mean that it would not demand continuous professional supervision. But certainly it deserves, at the initial stages, governmental help, both in evolving strategic management planning and developing the mechanisms for distribution of produce amongst the village communities.

3.2.1 Concept or Definition of Social Forestry

It is necessary to define what we mean by Social Forestry and for this purpose it is worth referring to some of the definitions conceived by several prominent Indian foresters.

> "Simple planting of trees and shrubs, which can provide firewood for use in forest-starved countryside in a couple of years, can result in direct increase of agricultural output by releasing cowdung and by providing soil conservation, planting of fodder trees, combined with a more scientific management of cattle, can result in direct supplement to rural income." [1]
>
> [Nautiyal and Chowdhary, 1979]

> "Social Forestry is, in effect, an integral part of the Gandhian philosophy of economic growth and community development." [2]
>
> [Pant, 1979]

> "Social Forestry is the establishment of wood-forage-food production systems on uncultivated lands. It has two purposes. It is to reduce destructive pressures on forest resources by providing economic alternatives to villagers who presently depend on forest exploitation for their livelihood. It is to improve the lot of these villagers by intensifying production of uncultivated, unforested lands." [3]
>
> [Romm, 1981]

These are a few of the definitions of Social Forestry, made in the context of satisfying rural India's present needs through the existing institutionalised forestry systems. Certain clear elements of Social Forestry have emerged, which we should try to consider in subsequent discussion.

3.2.2 Social Forestry: Difference with Traditional Forestry

First, however, we need to consider differences between the orthodox or traditional forestry and Social Forestry. Why should there be another institution called "Social Forestry", when there is already an existing classical or traditional "general forestry"? The main objective of Social Forestry is to meet the domestic energy need of the rural community; besides there are some subsidiary objectives of these programmes, such as supply of small timber, fodder, protection of degraded lands and improving the general ecological conditions of the area by covering with tree growth. However to satisfy these objectives it is necessary that special attention should be given to fast growing, multipurpose tree growing. These trees can be looked after by the village folk themselves, that is, not only in difference in aims, but also physical differences in management techniques, for example, selection of species, more emphasis on short rotation, multipurpose utility, greater involvement of local people in maintaining the newly generated forest resource - should be given.

Public opinion about forests and their benefits is largely indifferent. This is due to the long experience of villagers seeing that merchants and contractors come from the cities and remove the best forest growth and increase their wealth.[4] However, when the needy and poor remove dry or unwanted twigs from the nearby forests, they are often harassed by the local forest officials. In extreme cases they have to appear before the so-called mobile forest squad or court where penalities can be imposed.[5] The view of rural people is generally indifferent about the benefits of forests. They may even develop an apathy about state-owned forests. In spite of over three decades of existing National Forestry policy and forest management practices, there has been hardly any appreciable benefit to the

existing social system of rural India. The opinion of the public, particularly of the rural section, has either been eroded or is at least indifferent. One even hears the caustic remark from villages, "the foresters are there to cut the trees, and for helping big merchants and contractors". Villagers have recieved very little benefit till now from the public forests.[6] The so-called benefits, in the form of seasonal employment, collection of some minor forest produce, *bona fide* usage right, free passage through the forest, etc. - the rural poor have gained nothing worthwhile from the present forestry practices.[7]

The economic lot of the rural poor could hardly be lifted through the so-called intensive forest management practices prevailing at the present time. They not only need complete overhauling, but entire reorientation. The need for a new system with the objective of satisfying the many demands of the rural sector (the energy supply being the principal) cannot be over-emphasised. As has already been mentioned, the whole system must keep its objective in line with the Gandhian philosophy [Appendix 3.1] of rural economy. Social Forestry must be for the people, of the people, and by the people of the rural India, at least for its initial years. However, for its establishment, there will be need for substantial governmental and other organisations' participation to overcome constraints of economic, social, legislative and psychological in nature.

3.2.3 Economic Constraints

The Social Forestry programmes of India, as they stand today, mainly rely on the substantial provision of government subsidies.[8] It has emerged in our earlier discussions on the present rural scene in India, that the people undergo conditions entirely inadequate for their survival as human beings. They do not have sufficient food,

no proper shelter, no medicines when ill, no safe drinking water and inadequate sanitary conditions. There are large numbers of mostly unskilled and agricultural unemployed labourers in each village.[9] The result is a constant process of unskilled-labour migration towards urban localities seeking improved conditions. We get a very grim picture of rural India's economic situation as a whole. When such is the condition how can we expect the people's involvement to contribute in terms of monetary resources necessary for the establishment of Social Forestry plantations? The counter argument is that planting trees does not need heavy financial resources and the technology involved in it is very simple.[10] In spite of its simple technology, forest plantation starting from the nursery stage needs a lot of labour in its initial years of establishment.[11]

What reasonably could be expected is that the vast unemployed rural labour force can participate in programmes of Social Forestry, in terms of their "free or at nominal voluntary cost contribution" provided the labourer and his family members get free or at least heavily subsidised food.[12] It has been argued that the advantages of schemes under food-for-work programmes, Drought-Prone Area Programmes (DPAP),[13] Untyodaya schemes,[14] could be taken for Social Forestry schemes. Other important inputs of labour or money contributions from villagers would largely be determined by the villagers' interest in the projects. But it is also important to see how the villagers could be stimulated or motivated to participate in such community programmes of tree plantation. It has been suggested that the subsidies in terms of labour or monetary value (where this is within the permissible economic limit of the villagers), will depend upon the villagers' interest and this can be generated by the motivational processes by any specialised agencies. Obviously, subsidies by the

Government for the project could be smaller, if the villagers' interest in it were greater.[15] There have already been beneficial results in similar schemes taken up by some states of India, and people's involvement and participation are really encouraging [Appendix 3.2]. How much subsidies need to come from the Government (including Federal and State Government), cannot and need not be fixed at this stage. One point is very clear: Social Forestry is for the rural poor, and its benefits must reach them, whether they participate in direct monetary contributions or not. At this time it would perhaps be over-optimistic for the governments to expect any substantial direct economic contribution from the rural poor.

Next, we can focus on the 'socio-political' constraints related to the social forestry programmes of India.

3.2.4 Socio-Political Constraints

It seems ironic that, when people are busy solving the problem of getting a square meal for the day, they can be involved in petty politics within the village. Each tiny Indian village is racked with factional political conflicts. The origin of such petty politics is centred around the Hindu caste system. In spite of all belonging to a common village, the caste of each group plays an important role. The centre of power in a village revolves around the village leader who is usually from the strongest caste group, and he tries to direct the village activities. Experience shows that decisions in important matters will always be in favour of the dominant caste group. Economic factors also play important roles to determine caste leadership. The village leaders cannot be free from bias and this, in many cases, creates bitter conflict between different groups within the same village. The village as a whole is pressed by economic, social,

political, and unemployment problems (and the recent fuelwood crisis), but its various groups cannot patch up their inherent conflicting interests; there is always tension between the various members of different groups. This conflict surfaces when there are any works of common interest to start in the village area. This happens in the case of Social Forestry programme. Numerous examples could be cited - the establishment of agro-forestry under the drought-prone area programme, village wood lot programmes, pilot plantation schemes - have failed miserably due to village group rivalry.[17] Failure of plantations raised on roadsides, village common grazing lands, tankbunds, even in 'panchayat lands',[18] in the majority of cases is due to negligence by villagers, often even deliberately allowing the village cattle to graze there.[19] These negative activities within a single village group develop due to complex social patterns and group leadership conflicts. It is necessary to modify such conflicting groups for the common benefit, or for a social purpose. The Government needs to participate in activating various social organisations and agencies who in turn can stimulate the village community as a whole to social awareness in favour of the social forestry programme. The topic has its own dimension which is beyond the scope of our present discussion. However, the other important constraint which deserves our attention is:

3.2.5 Legislative Constraints

Even if we are right in our assumption that the two major constraints considered could be removed, the most difficult one will be legislative in nature. Before coming to the legislative aspect of land tenure, let us examine the land requirements and their sources. We have elsewhere mentioned that there is an inherent dilemma in the

system of land use in India. There still remain some vitally important questions on land tenure settlement. Even within the long period of over 35 years, India has not fully solved this delicate problem.[20]

It is important to find out our total land requirements for the plantation works of Social Forestry. It has been estimated that India's requirement would be around 20 million hectares of additional land area for only fuelwood plantation to supplement the additional demand from only the rural sector.[21] The obvious question is: from where can we get such huge areas? (Appendices: 3.3 & 3.4). It is pertinent to mention that half of the land mass of India still remains uncultivated.[22] The identification of this half (the uncultivated area) may not be difficult but the problem is the distribution or allocation of produce from such lands. From the very beginning a clearcut policy on the distribution of future produce from the Social Forestry schemes needs to be formulated, otherwise the inherent wrangling and conflicting interests (which have already been discussed elsewhere) within the village groups, may jeopardise the Social Forestry objectives. Raising plantations on Government/public lands may not create any problem at the initial stages, but at the time of produce distribution, complications may arise and, if the poor people have to take legal action, the purpose of Social Forestry would be entirely defeated.[23] Another important point is that plantations must be properly tended at their early stages of establishment. Otherwise, they may be wasted, eaten by village cattle or damaged by village children, either by deliberate vandalism or negligence. To counter such dangers it would perhaps be desirable that even the government lands (i.e. railway lines, roadside lands, tank-bunds, river-banks, etc.) be declared as 'dedicated'[24] to the village community of the area. It is essential to gain the confidence of the nearby

villagers. They must come to have the feeling that the plantation raised near their dwelling places is for their use alone, and that the benefits generated from such plantation will not go to others - individual or government.

As we have mentioned earlier, to make the Social Forestry programme successful, it is necessary to change the present attitudes of village communities as a whole. If the age-old conservative outlook of the village community towards the traditional forestry practices could be changed, the programme could succeed. This is what is important at this stage. The poor villager must be made to understand the importance of trees around his village. This task could be assigned to agencies such as the extension wing of agriculture, community development or village level workers. The task is to motivate the rural people and help to create a healthy atmosphere for successful plantation works in the rural area. This is a tremendous job. However, any coercive measures or radical approaches in this matter will not yield positive results (as has been experienced in some equally important problem areas such as implementation of the family planning programme in the country). The implementation of the Social Forestry programme, which apparently looks so simple, is sufficiently complicated and interwoven with inherent constraints which have already been mentioned. Some of these need further clarification. This we can discuss in the following:

3.3 DISCUSSION

The primary objective of Social Forestry is to produce woodfuel for the starved rural sector and to meet the challenge of the non-commercial 'second energy crisis' through which the country is presently passing. There will also be several secondary benefits from this programme. These are due to its capacity to generate

economic growth for the rural community as a whole. Though tree planting is a simple operation and does not need much technological involvement, in actual operation it does need a good deal of social and political organising at all levels.[25] This is because of the existing socio-cultural diversities, and the caste complexities in the Indian social system at the village level. It has been emphasised that the tree planting projects are almost always deeply enmeshed in the political, cultural and administrative tangles of a rural community.[26]

It is relevant to examine some other basic ingredients of the Social Forestry programme recently launched by India. The obvious question is whether the existing institutionalised mechanism of traditional forestry can satisfy the needs of the Social Forestry project implementation. Basically there is nothing wrong in the already institutionalised-traditional mechanism (including its managerial capabilities) of present forestry practices. What is needed is that a new conceptual dimension (for the benefit of rural societies) be added to it. As mentioned elsewhere, the prevailing general forestry practices in India could hardly satisfy rural demand.[27] To make the forestry sector a powerful instrument of social change a new dimension is urgently needed to be added to the already existing forestry mechanism of the country.[28]

The other very pertinent question obviously arises, whether there is a reasonable alternative to solve rural India's problem of 'second energy crisis', within the foreseeable future. Can India solve her rural energy problems by solar, wind, hydro-electric or even nuclear technology? There has already been a major breakthrough in nuclear power generation in India, and considerable progress has been achieved in solar technology.[29] But both nuclear energy

production and solar devices for trapping the sun's energy are initially far too costly for rural energy needs. Even if these technologies could bring new energy sources to the rural sector, it would first have to solve some other problems such as the improvement of agriculture, sanitation, health, public transport. We must not be over-optimistic; within the foreseeable future (at least for another few decades), these technologies will remain mere imaginary ideas to the rural poor.

The other most conflicting issue, the land utilisation dilemma, is that of food production vs. wood production, within the same land area. The land is very limited and high population growth rates and increasing food demands are central to the problem.[30] This subject demands more attention, and the issues involved are beyond the scope of the present study.

In the next chapter we should discuss the more important constraints, which are institutional in nature and this is the theme of the present study. Even though the technology, resources, manpower and motivation exist, the necessary developments cannot take place in practice unless the various constraints so far mentioned and other (institutional) factors can be overcome. How this may be achieved is the final chapter's main theme.

3.4 NOTES AND REFERENCES

1. Nautiyal, J.C., and Chowdhary, R.L. 1979; "A Forest Planning Process in India', University of Toronto, Canada; 1-101.

2. Pant, M.M., 1979; Social Forestry in India, *UNASYLVA*, 31(125); 19-24.

3. Romm, J., 1981; The Uncultivated Half of India, *Indian Forester*, 107(1);1-21.

4. Centre for Science and Environment, 1982; *The State of India's Environment:* A Citizen's Report, CSE, New Delhi.

5. The author, while working as a Divisional Forest Officer, in several places witnessed anger and physical assault by the lower rank forest staff to the offenders on some occasions.

6. Public or government forests - there are practically no private forests in India. All the forests were nationalised immediately after Independence.

7. As per *Indian Forest Manual*, any produce (legal definition) in the forest, other than timber, is classed as minor forest produce (MFP) for example, honey, wax, grasses, fruits, leaves etc.

8. Romm, J., 1980; Toward a Research Agenda for Social Forestry, *Indian Forester*, 106(3); 164-188.

9. Pant, M.M., 1978; Social Forestry: Its role in National Economy, *Eastern Economist*, 71(21-22); 1032-1037

10. National Academy of Sciences, 1980; *Firewood Crops*, Washington, D.C.

11. Pant, M.M., 1979; See note 2.

12. Chowdhary, R.L., 1981; New Perspective on Forestry Development, *Indian Journal of Public Administration*, 27(1); 161-180.

13. Kumar, S., 1981; DPAP: Concept and Approach, *Indian Journal of Public Administration*, 27(1) 85-96.

14. Untyodaya Schemes - These are special schemes drawn up by the State governments, at the instruction of the Government of India for the upliftment of the poorest of the poor. Food for works is provided under this scheme. This is the sort of social welfare measures recently introduced by Indian Governments utilising the working capability of the able bodied people in the poorest sections of the rural community.

15. Romm, J., 1980; See note 8.

16. Some of the Indian States like Gujarat, Maharashtra and Uttar Pradish are performing excellent work in Social Forestry Schemes, so far as initial technical considerations are concerned.

17. As a Divisional Forest Officer the author co-ordinated some schemes with village Panchayats which produced almost nil results. In most of the cases this was due to negligence by the villagers, with the belief that other groups would harvest the benefits.

18. Panchayat Land - term used to denote common use land where everybody has open access, but regulated by the Panchayat Committees, which are of recent origin.

19. This was the author's experience as an enquiry officer. In some cases, where plantations in Panchayat or common village lands were damaged, it transpired that the culprits were from the less dominant group in the village. They resorted to such vandalism assuming that the plantation being harvested would only benefit the dominant group.

20. Sen. S., 1975: *Reaping the Green Revolution* (Land Reform and Allied Problems). Tata McGraw-Hill Publishing Co., New Delhi.

21. Singh, B., 1975; Role of Forestry in Mitigating the Energy Crisis in India, *Indian Forester,* 101(10); 589-596.

22. Romm, J., 1981; See note 3.

23. One general complaint from the villagers is that fuelwood, raised with government subsidies in Panchayat lands, is sold to fuel contractors for economic reasons. The poor villagers neither have money to buy fuelwood, nor can they compete with fuelwood contractors.

24. 'Dedicated' - this involves a declaration to gain the confidence of the local villagers, so that they will realise that the Social Forestry plantation raised in the community or open access land is for the use of the local population alone. This is a measure for generating cohesive forces in favour of successful Social Forestry plantations.

25. Eckholm, E.P., 1976; The Other Energy Crisis: Firewood, *Ecologist,* 6(3); 80-86.

26. Baidya, K.N., 1983; Fuelwood Shortage in Third World: An ecoclimatic disaster (in Press), *Int.J.of Envt.Studies,* Blackburn, England.

27. The author (a professional forester from India) admits that the existing forest management practices hardly meet the normal demand of energy needs of the rural poor.

28. Shah, S.A., 1975; Forestry as an Instrument of Social Change, *Indian Forester,* 101(9); 512-516.

29. India's capability to produce energy through nuclear technology is known to the world. But it remains a mere fantasy to supply this energy to the rural poor; at best it may get to the city

elites and to the industrial sector.

30. Revelle, R., 1980; Energy Dilemma in Asia: The needs for Research and Development, *Science*, 29; 164-174.

4

INSTITUTIONAL CONSTRAINTS

CHAPTER FOUR

4. INSTITUTIONAL CONSTRAINTS : POLICY ISSUES, EQUITY, DISTRIBUTION AND MONITORING MECHANISM

4.1 SUMMARY OBSERVATION.

In this chapter an attempt is made to show that technical approaches are not the only ones for the solution of the rural energy problem of India. It is most important to evolve policies by which the distribution of the produce can reach the really needy groups. An analogy has been drawn from India's so-called 'green revolution'. It is said that due to the green revolution India is self-sufficient today - she need not depend on overseas countries for food grain imports. But that does not mean that people are not dying of starvation. The simple reason is that the poor have no access to food grains; their earning capacity is far below what is needed to provide a square meal a day. Advantageously placed farmers are becoming richer and richer with the application of newly invented inputs of the green revolution.[1] Due to various kinds of socio-cultural, political, and economic disadvantages inherently persistent in the existing social systems the poorest of the poor groups are hard pressed and striving for mere survival; some of these factors have been examined in preceding chapters. However, it is necessary to emphasise that failure, in most cases, in development activities in the developing countries is due, not to technical or innovational causes, but to lack of institutional change. That is to say, the problem of food shortage in the developing countries can be removed by the people themselves - provided the primary limitations, which are institutional rather than physical or technical (some say "technological"), can be removed. The land and

water resources are not a major constraint to expanding food production, although in some areas equitable distribution of these resources may be important limiting factors. The proper seed, fertilizer and machine use no doubt is relevant and important for enhancement of production, but what ultimately matters is the distribution of the produce, so that the effects be felt generally. This possibility can only be realised when the politicians and bureaucrats introduce reforms and improvements to remove the current institutional barriers.[2] The same is true in our present consideration of woodfuel. The physical and technical constraints which operate against woodfuel generation in rural areas are not difficult to overcome, but unless and until radical changes are introduced in the existing institutional structure of the socio-economic and political system, the end result will be totally unsatisfactory.

The existing forest policy of India (1952) is revenue-yielding and for the benefit of the urban community in general.[3] The rural people get nothing out of it but token benefits. In fact, there is no specific rationale for the rural communities to harvest the benefits from nearby forests.[4] In all planning there is no clear indication given about how the rural/urban groups should fairly share woodfuel. What is needed is to create institutional developments first, and the technical ones will follow naturally. More importantly, as we have seen, the social structure of rural India has its own traditional, firmly rooted, institutions; and to fit the external technical innovations in that system it is necessary to reorient those institutional arrangements. Forestry development, especially the social forestry component in India, must be seen as an institutional development first and later as changes in technique. Decisions as to whether one plants *eucalyptus*, *gmelina*, *acacia*, or *leucocephala* are quite trivial

in the long run.

In formulating and designing rural wood energy projects, i.e. social forestry plantations, most attention must be given to the creation of available institutions at the local level. This does not mean that we should not suggest planting of suitable species. But the planting of suitable trees should be seen as an adjunct to the institutional change, rather than as the main activity. To set up this institutional arrangement it is necessary to know who controls the land use, who can use the non-private land, who benefits from that use, and who will pay the costs of such use. Forests have been devastated in India because of institutional problems, not because of technical problems.[5] Similarly, forests can be restored only through institutional arrangements, which need to be made with that outcome in mind.

We have seen in our earlier discussion that the pattern of supply and demand for cooking energy is extremely complex. People live in different ecological regions, diverse conditions, different types of settlements, and have different levels of income. The only common factor is that everyone needs energy to cook his meals. Introduction of new cooking energy systems will have to be far more systematic and acceptable to each section of the society, especially in the rural sector. Each source of energy or technology has its own economic, social and ecological place and it is only in the right context that it can work. Blanket solutions, such as biogas, or solar energy for all, cannot work.

A rational policy on cooking energy also has to take into account the increasing interaction between the energy needs of the urban and rural areas.[6] Indian social forestry programmes, whose main objective is to meet community needs of firewood for cooking,

have not yet finalised some basic policy issues. Though these projects are still in early stages, there are already problems, with benefits mainly going to richer sections of society. In reality none of these programmes is helping to increase the production of firewood. The increased supply goes to those who can pay - the paper and pulp industries, and urban consumers.[7] When, for example, it has been profitable to grow wood, one state of India (Gujarat State) has thousands of farmers who have turned over good irrigated land to tree farming,[8] with the social foresty government subsidies; they have even proposed to build thermal power stations fuelled with wood. If this were to happen, only the rich would benefit. A "second green revolution" through the social forestry programme may happen, considerably increasing energy production, but the poor are still starved of fuel. We must consider the equity, distribution and mechanism of monitoring, by which the gap between the well-off and the poor can be minimised. Some of these problems can be discussed further.

4.2 POLICY ISSUES: HISTORICAL PERSPECTIVES

The Indian forestry system is now well established; it has a history of over 100 years of systematic management practices by the British administrators.[9] Ninety-seven percent of our forests are under state control and over seventy percent of them are under management plans.[10] But one thing is clear; these forests are managed for commercial purposes - for urban-oriented products. In 1927 Indian forest policy did not mention anything about rural energy supply or firewood supply to village folks.[11] No systematic attempt has been made to raise fuelwood for the specific purposes of those communities. Even the Independent India's Forest Policy (1952) skeptically avoided this important item.[12] As a result, this remained completely neglected.

Only in recent time, due to acute shortages of alternative fuels in urban areas, have they diverted their attention to woodfuel energy resources, and it was almost a new discovery that trees can supply energy and are renewable. The planners, politicians and administrators realised simultaneously that this is the ultimate resource, which can solve the energy needs of the majority, with minimum cost, and keeping the environment undisturbed. Social forestry is considered to serve the purpose of satisfying the rural energy needs of the developing countries. It is assumed that this alternative is within the socio-economic means of poor communities. India's social forestry 'technology' is of recent origin, and the planners, politicians, the admininistrators and the management authorities have given consideration mainly to one aspect - that of techniques. Any technology has two important elements in it - technique and institution.[13] The first element (technique) is no doubt important, but the second element is more important; if the second element (the institution) is non-receptive and non-adjustable to the first, the net result is negative. That is why it is wrong to consider only what species of plants, how they can be planted, what fertilizer, how much water is needed, where they can be planted. The important questions are: who plants? where are these to be planted? who owns the land? how much can they get of the produce? how much do they need? who determines needs? which authority monitors the produce distribution? so on and so forth.

These fundamental questions have not yet been dealt with in Indian social forestry documents. It is expected that unless these questions are settled by clear policy on the objectives of social forestry, the rural woodfuel cooking energy problem will remain unchanged.

One important reason why village forestry projects in India have so far been of little interest to external and national participants is that they provide little benefit for urban industrial markets and there is very little export demand for their products. It is also considered as historical fact that a pattern of "domestic colonialism" exists within national governments, and within the village economy as a source of products for the "colonial powers".[14] This hypothesis is also consistent with the long-term interest in commercial forestry activities. The other relevant fact is that the urban areas are increasingly plagued with shortages of fuelwood and suddenly many governments are becoming interested in village forestry projects. All the governments are aware of technical constraints, such as financial inputs, land base, species selection and other ancillary obstacles, but none of the state governments has shown any policy interests, or consideration of how the more fundamental questions can be resolved. It is apparent that this important factor has either not been considered or those involved do not want to reform the existing traditional institution. To clarify further, it may be necessary to discuss some definitions and show their interrelations to one another and how these are responsive in the techno-administrative system of the woodfuel energy development.

4.3 TECHNIQUE, TECHNOLOGY AND INSTITUTION

There may be various ways to define these terms, one common factor is that each one tries to satisfy the objective of common interest for public purposes in some way. The recent conceptual definition (which seems appropriate) has been given by Bromley (1982) - "Technique represents the physical capacity of a society".[15] It consists of the machines, the physical inputs and the knowledge that

show how physical objects are to be combined and utilised, whereas technology goes beyond mere physical and mental objects. A technique represents the specific manner by which humans interact with their physical surroundings to create objects of utility, for example, food, clothing, shelter, enjoyment, etc. In its simplest form Bromley has cited the Indian *bullock cart* and the *scythe*, which are tools, but they are also techniques as they are used in a particular manner to satisfy a particular task.[16] In a similar sense high-yielding rice varieties and fast-growing tree species (used in social forestry plantation) both represent technique. Irrigated agriculture is a technique; planting trees on hill slopes to arrest soil erosion is a technique; gathering firewood and dungcakes for domestic energy use is also technique. In a more conceptual framework it can be said that technique is the basic physical aspect of man's daily existence.

The second important element is institutional structure, and when the two - technique and institutional structure - combine what we get is technology. It can be said that institutions are created by collective action in restraint and in liberation of individual action. Institutions indicate or determine what individual members of a society can and cannot do, what they can expect others to do or refrain from doing. Not only that, they indicate what people can expect their government to do on their behalf.[17]

Institutions represent the existing conventions, rules, norms and habits that define individuals in relation to others in the society and the individuals with respect to power. Property arrangements, with respect to tools, land and livestock, are institutions. But the marriage system, child-birth, diet, clothing, burial or dead body disposal are all institutions and conventions. In a society, institutions give shape to the innumerable individual actions;

institutions create order out of chaos, produce stability out of uncertainty respecting the actions of others.[18] It is when institutions combine with technique that a technology is created. Technique without institutions is inanimate and ineffective. Institutions define technique in a social setting and motivate its use to private and social beneficial ends. Social forestry plantation is a technique, in reference to questions of what species are to be planted, what space between the plants, on what type of soil, and rainfall, climatic conditions, etc. But when combined with institutional arrangements that determine who will get what on a percentage basis of the produce, and when it is to be harvested, then we have social forestry technology. This includes the cultural practices, the land tenure, the physical and financial inputs in the system, in addition to the planting technique, etc.

Institutions characterise the technological structure of a society. Institutional arrangements may define the relative attractiveness of traditional or modern agricultural practices and certain techniques may be favoured by certain institutional structures. Depending upon different techniques, institutional arrangements may look more or less attractive and one may argue that technique is a constraint on institutional innovation. Under any given technical structure, it is the institutional arrangements that foster economic change and development. This is relevant to the problem of inertia in the rural economy of India. The traditional farmer is resistent to change for the simple reason that it represents a new set of choices to which he finds it difficult to adjust under traditional institutional arrangements. Similarly, many of the overseas or foreign adopted techniques or 'technology' cannot be fitted into traditional institutions of oriental cultures.[19] We borrow financial inputs,

technical knowledge, but we cannot get foreign institutional arrangements to fit easily into our existing ones. That is why there may be a failure of a new production method. The private demonstration efforts in most developing countries are much more compelling than the results from government demonstration plots. It is necessary to design the innovative techniques in such a manner that the problems at the village level get preference over those of urban areas in regard to the wood energy technology. The process must be such that the needs of the local participants, the beneficiaries, are really met. It must also be borne in mind that the process must be consistent with the larger parts of the existing technical and institutional structure of village India.

The economy of rural India is basically dependent upon some lands that are held in private ownership by some people, while the remainder of the land belongs, in common, to everyone.[20] The first category, under private ownership, is where institutional arrangements are clearly defined as far as legality of ownership is concerned; this is the major part. The second category is less clearly defined. The first category produces labour-intensive crops, while the other yields extensive produce such as forestry, or is used as grazing fields, pastures, 'gomals',[21] etc. However, the difference is not so much technical as institutional. Considering this difference in the institutional arrangements of lands, it is reasonable to argue that the destruction of the common land is due to basic differences in institutional nature. However, for further discussion on this point, we can focus on forestry land both from technique and institutions' points of view.

4.4 FORESTRY OR SOCIAL FORESTRY AS INSTITUTION AND TECHNIQUE

As we have discussed earlier, the combination of technique and institutions define what is meant by technology. The institutional arrangements determine the access to the produce from the land; they are more important than the technical aspect, and determine how forestry produce can be generated. Even the best-suited species in the world can hardly survive the continued abuse by man or livestock.

An important problem in social forestry (or rural woodfuel technology) is that of institutional structure, i.e. how to control resource use on lands where control has been missing for a long time.[22] The first category, privately owned land (crop land), has no such problem. The tradition is well established in those who own agricultural land. But there is no such simple pattern for common land. Here the most important element is missing - common property institutions exist for the individual villagers to share, but without responsibility of the residents of the village to protect those lands. There is a major difference between common property resources and open access resources.[23] Open access resources, in economic terms, have been described as: "everybody's property is nobody's property", or more correctly, "everybody's access is nobody's property".[29] When all have a claim to use something, no-one has a claim on a secure income source. Similar situations have arisen in common grazing lands (gomals) in India today.[25] The result is that the resource is depleted. The logical question is: why not establish private property rights over those lands amenable to forestry plantations? This, however, would be inconsistent with the cultural history of the country. There is a basic difference between the Western economist's concepts of private property rights and those of an Indian. It is necessary to seek a more economically compelling reason for resisting the

establishing of private property rights over much of this land.[26] It is appropriate to refer in this regard to the following statement: "The summer alps are too poor relative to the valley bottoms to support the social investment in private property, finances, separate water facilities and so on; the policy could not afford to invest the same level of social infrastructure in these relatively poor lands"[27] - the same holds true for the open access lands of India.

This is not to say that these common lands are not vital for the survival of the village community. Though these resources are relatively poor, they have a very high utility. Moreover, being relatively poor, they do not lend themselves to private exploitation. Holding these resources in common lessens the possibility that entrepreneurs may be able to acquire them and so exclude others.[28] It is one thing for cropland to be concentrated in the hands of a few; it is quite another for all of the land to be so controlled. What is necessary is a combination of efficiency and fairness rather than private ownership of these essential resources.[29] However, in a socio-economic context, it can be emphasised that, if managed properly, the rural forestry programmes (social forestry plantation) have the potential to provide a "Pareto-safe"[30] outcome for all the people of the village. This is why it is necessary for these programmes to be created as an institutional development first and then as changes in technique.

There are many inherent difficulties no doubt. Many foresters do not know much about institutional arrangements - but no-one else involved in the process does. Even if we know for certain what to do, it is not easy to bring about institutional change at the local level. It is equally difficult for national or foreign experts to have any effect in this at the village level. But, however difficult this

may be, to proceed with the techniques of forestry without institutional arrangements being settled is to doom the vast majority of projects to certain failure.

As we have noticed in our earlier discussion (Chapter II) the objective of integrated rural development cannot be fulfilled unless there is basic change effected in the existing institutional system. What is needed is to evolve radical but consistent policies by which monopolistic tendencies can be avoided. But these questions arise: How to do that? Is it possible in the existing political system of India? In a free-play economic system and a democratic form of government with individuals' rights to property, practicing any form of livelihood cannot be too restrained by regulatory processes. But it is possible through the legislative machanism to evolve policy issues and legal measures for the benefit of the majority. They represent the greater number by their representation through the ballot papers.

The privately owned cropland can be controlled by national governments, to provide cheap food for the urban poor or even to provide export earnings; whereas the developers, planners and administrators should apply their skills and techniques to those resources which only the poor can use. This is the open access areas of India, on which depend the villagers' livestock, fuelwood, small timber and other community use. This is why it is necessary to have a "social forestry policy" - the objective should not be the enhancement of the commercial lands of the wealthy, or those of the state for revenue purposes. Rather, it should be concerned with public lands upon which the so-called "poorest of the poor" depend for their survival.[31] Social forestry - if it is conceived as a combination of technique and institutions, can solve the rural energy crisis of India and bring many other economic benefits which are related to it.

The institutional imperative of social forestry projects implies that it is necessary to pay particular attention to the rules at the local level which define control over use rates of various products. It is also equally important to know (while formulating projects) what would be the impact of newly designed institutional arrangements at the local level: to define who controls land use; who can use the non-private land; who benefits from that use; and who will pay the costs of that use? We have mentioned in our earlier discussion that the forest resource depletion in India is institutional in nature and, while formulating and designing social forestry projects, it is necessary to pay attention to the existing institutional environment at the local level.

Some of these problems can be alleviated by assistance of both an investment and a rule-making nature on the lands in question. Other problems need changes in the social infrastructure that bring economic value to those lands in particular use. There has been a long history of both types of assistance on privately owned agricultural lands and their related infrastructure, but very little experience in dealing with collectively used lands such as the social forestry programme envisaged now.

However, this new dimension has opened up exciting challenges and possibilities for those who are seriously concerned with the problems of rural India vis-à-vis the energy crisis. It is crucial how the politicians, social workers, legislators, administrators, planners, scientists and managers conceive, formulate, design, evaluate and implement such important development programmes. Perhaps it will be necessary to alter the normal bureaucratic procedures and to increase administrative efficiency. There is the possibility of opening up the process to new participants at the local, national and international

levels. It will be important to have careful negotiation about institutional arrangements and these will become the centre of attention rather than merely the apparently 'Pareto-safe' physical structures.[32] What this means is that the local labour force which is available (and plentiful) should be used to its fullest capacity in such community development programmes. The organisers should spend most time working with local participants and not merely time on bureaucratic procedures. In the next few sections some fundamental issues related to social forestry are discussed.

4.5 POLICY ISSUE: OBJECTIVE, RESEARCH

As mentioned earlier, the concept of social forestry is of recent origin; it is an offshoot of main stream forestry and, as such, no categorised policy issues have so far been formulated. Formulation of policy issues is time-consuming, and due to urgency most of the states have tried to fit in social forestry within the existing traditional forestry policy, and the means by which this can be established and implemented, determine the extent to which resources contribute to economic and social well-being of a vast number of people. However, we are most concerned with how the policies, once evolved, can lead to efficiency in distribution of the produce (equity), rather than consideration of the means by which such policies were evolved. But one thing is certain: a good and effective policy is judged or evaluated partly by the processes through which it developed. This itself is the result of institutional evolution. It is necessary to have a thorough research programme on evolving policy issues, which are more efficient, more effective and more equitable. In this field the Indian social forestry system is still in its infancy.

In a commercial forestry management system the terms such as

"forest policy" and "policy making processes" are liberally used throughout forestry literature and, as they are often ill-defined, attempts have been made clearly to establish goals to be achieved by a programme of forest policy research. More simply, it may be asked, what do we mean by the word 'policy'? For most it implies a course of action which has been selected as a means of achieving a desired objective".[33] In another way policy has been defined as being usually reserved for decisions which are "... parameter shaping acts which are taken most seriously, which are presumably most difficult to arrive at and at the same time most difficult and important to study".[34] Since policy making is "political" it is relevant to consider how the "poorest of the poor" can have reasonable access to such processes. They do have the chance to influence through electoral mechanisms, but because of their insignificant socio-political and economic positions, they seldom have much impact. The common man need not bother to involve himself in the forest policy processes, but he is interested how those policy issues can satisfy his needs. If the people concerned are not prepared to exert the necessary effort, either by personal involvement or through their elected representatives, how can they expect that their needs can be satisfied by those policies, which may be basically wrong, or favourable only for a particular group in the society? A defective or inoperative forest policy is analogous to an inoperative fire department - it lulls the householder into a false security with a rude awakening when a fire occurs.[35]

Once policies are evolved they operate in several ways.

(a) *A decision-making apparatus:* This is the first stage, to have an issue brought up for consideration at policy-making levels. It is necessary to have policy issues debated adequately and to have the decision reached in the best possible way under existing conditions.

A good decision-making apparatus does not always guarantee wise decisions. If the apparatus is good, the probability of good decisions is increased.

(b) *Decision implementing:* There may be more than one way of doing a job, for example, social forestry plantation in a village community. The organisational set-up must be adequate. This is a major part of administration - public or private.

(c) *Supervision or monitoring:* There must be some mechanism for continuing supervision, for inspection of operations and of results. It may review procedures and objectives. There must be feedback from operations to policy-making and policy-implementation. New possibilities may open up as a result of experience. The original policy may need to be modified in the light of experience or changing situations.

(d) *Physical Inputs:* If policies are actually to be implemented, then men, materials, and finance must be provided in sufficient amounts and at the time they are needed.

However, so far as our study is concerned we are more concerned with the first three elements (a), (b), (c) and with removing any constraints related to these. As has been emphasised earlier, the Indian community programmes are concerned with constraints more of an institutional nature than technical. Moreover, the deep-rooted interlinkages between the various socio-cultural, political and institutional arrangements have great impact on the system and it is not easy to produce effective change in it. It is impracticable to attempt some social forestry policy which is socially or culturally unacceptable in rural India. Social acceptability is not unchangeable, though it may be slow. Cultural attitudes are a fact of life and may be more difficult to change than the composition of the forest stand.[36] It is also true

that the political process is one way in which social attitudes are modified, though politics also has its own internal mechanisms, process, patterns and motivations. But these are beyond the scope of our present study.

Returning to our main question or analogy of the green revolution, we have to ask what consequences the emergence of progressive farmers are likely to have for the system of economic and social inequalities. Someone may argue that the spread of this kind of farming would increase and not reduce inequalities between classes.[37] As we have shown in our earlier discussion (Chapter II), it is leading to an increasing control over land, since the effective unit of production can be enlarged by increasing the amount of land owned or the amount of land leased. Here also the basic problem is related to institutional arrangements rather than technical or 'technological'. Some of this we can discuss in the existing social framework.

4.6 INSTITIONAL MALADIES: STRUCTURAL PROBLEMS

Inequalities in the material conditions of existence are accompanied by a host of other inequalities in Indian society. These play an important part in all hierarchial spheres of life. The relationship between the "landlord" and the "peasant" is determined by certain fundamental orientations in which social inequality has been accepted as one of the necessary conditions of human existence. However the value placed on such social inequality is now being challenged in Indian societies, but it too deeply rooted to be dislodged without radical transformation in their character.[38] Social inequality is present in one form or another in all complex societies, but there are few with such contrasting differences as we find in India. A social

hierarchy in its purest form exists in the caste system of traditional India and it has played an important role in the stratification of the Indian social system.[39] While it is outside the scope of the present discussion, it might be well to bear in mind, that any economic measures to be conceived for those communities need to give special attention to fit the background conditions.

It may be relevant to remember in our present context that hierarchial values in the largest sector of a society have implications for the society as a whole. When a new organisation is created it is pervaded by the traditional values. We have already seen how quickly the co-operatives, block offices, panchayat administration, and school boards, become involved in hierarchial patterns. In the first place, recruitment is selective, partly because of existing inequalities in training, education and ability, and partly because of prejudices against the "culturally backward".[40] Secondly, these organisations develop their own hierarchies and concern for status which often distort the very purposes which they are designed to achieve.

The common view, that with a little more money and a little more fertilizer and technical know-how, problems of land tenure and of redistributive wealth could be easily or quickly solved, has now been discounted. Attempts to understand and come to grips with problems of landholding and of redistributing wealth are as old as historical records.[41] It seems clear that the elimination of massive poverty can never be achieved by surplus production alone; India's population-poverty problems do not arise from lack of natural or human resources nor from lack of technological potential necessary for the production of agricultural surpluses. In short, economic growth alone is not the answer to poverty. Attempts to abolish poverty by mere economic development, without dealing with questions at the deepest levels of

"ideological" and institutional conflict can only beg the question, and surely will end in futility.[42]

For the second "green revolution" in the name of Social Forestry plantation, social justice is considered as an essential input, and its seeds must be sown at the same time as the "miracle seeds". Because more than anything else it will hinge on the fate of "tree revolution" (Social Forestry). It is an accepted fact that the prosperity of a nation cannot be achieved with the path of social justice. Social injustice within the community group must be halted and it can be halted only in one way - through effective policy measures, and through which the poorest of the poor can have access to the newly generated resource. It is needless to emphasise that the gospel of *laissez faire* at this juncture of India's history, is no doubt fatal.

The purpose of National Planning is to promote development of the people - to promote the welfare of all people in all strata of the society in a given time. It is obvious - today wood energy has become an elemental need for the rural poor.

The decision factor in the final analysis will be to reorient their thinking and to pave the way to the adoption of a rural wood energy plan of development whose benefits are within the barriers of those for whom this is designed. The problem is vast, complex and acute. In fact, the awesome drama of the fuelwood race has entered into the problem. Furthermore, besides tremendous demographic pressure, there has been added democratic antics to it. But if the planners, politicians and administrators mind, there are solutions to this problem. It may be said that tree planting must not only be impregnated with yield-boosting 'genes' (high yielding, short rotation, multipurpose trees), but one must go far beyond the long trodden path.

4.7 CONCLUSION:

The present study has, so far, drawn attention to a number of important issues which are interrelated to rural India's wood fuel energy supply. These are social, political, legislative, administrative factors, rather than technical problems and these are more often than not ignored. The socio-economic factors and technical solutions are, no doubt, critical. But the success or failure of rural wood energy system depends upon a whole range of social and cultural factors and their interactions. The technical problems are often easily solved while those of social nature are more problematic.

As mentioned earlier, it is not the intention of the present study to tabulate a list of policy recommendations or outline specific technical solutions of the present Indian Wood Energy Problem. Rather, the thesis has proposed to draw attention to a number of issues, some of which have been discussed in the study, which need to be at the centre of policy formulation. Not only that, these issues need to be constantly kept in mind by those responsible for formulating, executing and evaluating policy related to rural India's wood energy problem. The list of issues discussed or referred to is not necessarily exhaustive and the study does not claim to cover all the important issues. But one thing is certain that in the absence of a rational policy, or a failure of the political system to carry it out, the chances of the successful adoption of a rural wood energy programme will be minimal and fragmental.

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6 APPENDICES

6. APPENDICES

APPENDIX 1.1 *A New Mystification: Social Forestry*

Source: Development Forum, January/February 1982 (Claude Alveres).

APPENDIX 1.2 *Indian Forest Bill*

Source: Ministry of Agriculture, Government of India, 1982.

APPENDIX 1.3 Solution of Financial Constraint

Source: World Bank, 1982.

APPENDIX 1.4 Species Selection

Source: Report of the Fuelwood Study Committee, Planning Commission, New Delhi, 1982.

APPENDIX 2.1 The Message of Indian Chipko Movement

Source: Baidya, K.,1982 (*My Forest*, 18(4), Bangalore, India).

APPENDIX 3.1 Gandhian Philosophy of Rural Upliftment

Source: Kripalani and Meghani. 1969 (*Teachings of Gandhi*)

APPENDIX 3.2 On Uttar Pradish's Social Forestry Success

Source: Development Forum (July/August 1982, Article by John Madelay).

APPENDIX 3.3 Land Resources Available for Social Forestry

Source: Reference Note 21.

APPENDIX 3.4 Uncultivated, Unforested Land for Social Forestry

Source: Refernce Note 3.

JANUARY-FEBRUARY 1982

Development — Forests — Fuel — Development — Forests — Fuel

A new mystification?

by Claude Alvares

Some social forestry is old practice rhetorically dressed up

On paper we have another revolution, heralded in terms similar to those once used to describe the Green Revolution. For ecologists, energy specialists, planners and those involved in improving the quality of life in the rural areas of the Third World, "social forestry" is the new panacea, the final solution, to the firewood shortage that is already harassing the rural poor. In fact, social forestry is even being advertised as a safe, alternative, ecological approach to rural development on a sustained basis. In India, Central and State governments, Indian and international financial institutions like the World Bank and the Swedish International Development Agency (SIDA) are attempting to outbid one another in pumping in funds for the propagation of social forestry schemes. Central government alone has set aside one thousand million rupees over a five year period (1980-85) for growing more trees in the countryside.

Two recent illuminating and brilliant studies* provide incontrovertible evidence, however, that the social forestry programme is heading into trouble fast. Both deal with trees: the first deals specifically with the proposed social forestry proposals of the south Indian state of Karnataka and the World Bank; the second consists of a reconstruction of the agricultural ecology of South Mysore (an area in the same state) 20 years ago, with the focus on the socialized forestry of traditional agriculture, and the collapse of this in the face of modern cash cultures. Much of what these social scientists incisively demonstrate is being corroborated by independent studies of social forestry schemes in Tamilnadu (a state adjoining Karnataka), done by Dr Rathindra Nath Roy of the A.M.M. Murugappa Chettiar Research Centre in Madras, and by reports of similar schemes going awry in Uttar Pradesh, Haryana, Gujarat, Rajasthan and Punjab.

The general conclusions reveal that social forestry is headed the way of the green revolution in its devastatingly negative impact on employment, food and ecology; just as the green revolution created surplus food stocks while millions found themselves without the purchasing power to plug into the new prosperity, social forestry schemes are leading to a firewood crisis even while thousands of hectares of land are being enthusiastically crammed with trees. In the process, an earlier, less destructive agriculture is being cut loose from its ecological moorings.

The firewood shortage has numerous causes, but the principal one involved denying the rural population access (for fodder and fuel) to the natural forests, as these were gradually declared "reserved" by the British colonial government, and later, by state governments. This increased the pressures on non-reserved village woodlots and grazing commons, leading eventually to their total denudation. Today, despite the pious encyclicals of government officials and forest conservators that we should protect our forest wealth for ecological reasons, the natural forests are being diverted to industrial use legally and illegally by timber merchants in collusion with foresters and government corporations, under the guise of "scientific forestry management"

But trees have also disappeared, as B.V. Krishnamurti points out, because cropping patterns have been uncritically and drastically altered from polycultures to monocultures, and from organic systems to chemical dependencies, destroying the symbiotic relationship that has always existed between agriculture and trees in traditional practice or habit.

Trees from the forest or the fields once provided fodder for animals, poles for housing and green leaf for mulch. At the time, animal dung was mostly kept for the fields instead of being consumed as a fuel, as is the custom today. Certain tree species like the *honge* (Pongamia glabra) were really speaking a part of agriculture; others, like the tamarind *(Tamarindus indica)*, provided liberal supplies of fruit pulp, a vital ingredient in food preservation. Oil from *honge* seed was used for medicinal and lighting purposes, as it still is in certain villages today.

Before the spectre of the green revolution began to haunt the countryside, traditional farmers in this country, very much like their counterparts in China, rarely planted trees on crop lands. They planted them instead on the bunds that divided the fields, or on the unrivetted side of tanks. (The Chinese even today avoid growing mulberry trees on croplands: they use mostly bunds and other waste or unutilizable areas). These trees provided shade, held the bunds in check against erosion, provided *in situ* manure, prevented wind and soil erosion, and stabilized hydrological and soil systems. When old, they were cut down for fuel, for agricultural implements and bullock carts.

But today, except in certain areas, this situation has ceased to obtain. Nearly 20 per cent of manpower in rural areas, Dr Bandyopadhyay *et al.,* point out, is now directed from productive work to fuelwood gathering. In some parts of the country, two mandays of labour are spent per family per week on the same task. Since fodder trees and grazing lands have disappeared, animals are getting weaker and their potential for draught or milk has become greatly reduced, leading to poor tillage practices, delayed planting and malnutrition.

The organic content of the soil is no longer replenished with green mulch: plants denied humus become increasingly susceptible to disease and pests, providing further inroads for multinationals producing harmful pesticides and fungicides. Erosion is another widely accepted consequence, leading to further declines in yields, unless the farmer in desperation uses extra large doses of chemicals, "running faster on one leg" as one practitioner described it. Our agricultural scientists, trained now only in green revolution techniques and denied access to the Howards and the Balfours, bury their heads in the sand, refusing to acknowledge the gradual, inexorable ruin of our soils.

Social forestry has been conjured up to meet these serious difficulties: the "social" quality of the forestry is, I imagine, a purely linguistic tool, to co-opt a rural population into a scheme of things where they will have to pay for the fuel which they once got free.

Besides, until one has the co-operation of the village people, saplings tend to disappear overnight, or goats and cows help themselves to a free meal. In Uttar Pradesh (a northern state), the Social Forestry Directorate, in association with *panchayat* village Forestry Committees, is supposed to look after the plants till maturity. In principle, villagers are to be permitted to meet their needs with "lops and tops" from these forest cultures free of charge or at a small premium.

On harvesting, the wood will be shared presumably equally among the villagers. Who believes such promises nobody knows. With every single developmental or technological innovation in which *panchayats* have had a hand, the weaker have been kicked in the teeth, while the richer have enjoyed the cake. Merely because labourers are paid to dig pits and plant seedlings in no way justifies the elaboration of a mythology of community participation, since the poor know anyway that the final product will rarely reach their *chullahs* or stoves. Except on paper.

But suppose for one moment that what is writ on paper will also be translated in practice? There is a more revealing indicator of true intentions and one which readily manifests the true nature of the social forestry "revolution": the tree selected for this planting jamboree is the eucalyptus hybrid, an ecological terrorist that provides neither fodder nor fuel, nor green mulch nor shade. In fact, its destabilizing effect on water tables is well known even among foresters. But eucalyptus is also a prime candidate for industrial use and that is the heart of the matter.

The conversion of crops like casava, sugarcane or grain to produce gasohol was criticized severely because it was based on the usurpation of good crop land in a world of starving millions in order to produce power for the exclusive transport needs of the affluent. The misuse of agricultural land to produce trees for textile fibre or paper would also have come in for questioning since these are luxury goods and cannot take precedence over food. (The A.M.M. Murugappa Chettiar Research Centre, always sensitive in these matters, got a little disillusioned when it set out to calculate land requirements for *casuarina* to fuel a power plant of 140 MW).

Passing off the change in land use from food to tree as "social forestry" was a stroke of genius: the eucalyptus in Karnataka's grand social forestry plan goes to textile and paper mills in the area. And in Tamilnadu, Sweden, known for protecting its own sylvan wealth with a total fanaticism, has little qualms about getting its SIDA to finance a social forestry project that will eventually benefit WIMCO, the Swedish multinational.

In fact, this is the most disturbing trend in the social forestry "revolution": the trees are ostensibly to be grown on waste lands, road sides, canal embankments or village commons. But these original objectives have by now been totally subverted on a national scale. In Gujarat, the World Bank, the latest pretender to ecological wisdom, planned for "only" 1,000 acres of private crop land to be put under eucalyptus. What happened? In one district alone, some 10,000 farmers switched irrigated food-producing land to eucalyptus.

▸ p. 4

Forestry for local community development –FAO

Forestry for local community development, Forestry Paper No. 7, *published by FAO Forestry Department, 1978, $4.80. Available in English, French and Spanish from Distribution & Sales Section FAO, Via delle Terme di Curacalla, 00100 Rome, Italy.*

Forestry for Local Community Development gives an account of FAO's recently formulated people-oriented approach to the management of forest environments. As population pressures tax these environments to an increasing extent, new ways of maximizing their economic potential have to be found, without destroying delicate ecological balances. The challenge lies in how to raise the standard of living of an increasing number of rural dwellers: the ultimate object of the approach is not a physical one of growing more trees but more one of involving more people in the management of their existing environment.

The first part of the book shows how forest products are used to provide fuelwood, food and employment. Examples of the implications of the depletion of the world's forests are given: more and more man-days are wasted by the 1.5 billion users of fuelwood in their search for supplies. In Haiti, a principal impediment to the introduction of new food crops is that often they need longer cooking and therefore require more fuelwood which is scarce and expensive.

Part two outlines ways in which improved forestry policies can be implemented; but it is acknowledged that if this is to be achieved successfully, there must be full commitment from governments. This may mean modifying existing land tenure, credit, and education institutions: the re-education of professional forestry staff and government officials who are concerned with implementing these new approaches is particularly stressed.

Part three discusses how new community forestry projects can be designed. Part four, almost half the book, consists of reports of successful projects and gives technical advice on the development of forest products.

Forestry for Local Community Development points out new directions in forestry management and forest utilization, and is a useful overview of how this approach may be developed–**DEEP**. ■

A new mystification

continued from p. 3

The reason for this, of course, is that it is more profitable to grow eucalyptus than *casuarina, honge,* tamarind or, for that matter, wheat, rice or *ragi.* The production of *ragi,* the poor quality millet that forms the poor man's staple diet, crashed from 175,195 tons to 13,340 tons in three years in Karnataka alone, due to the combined onslaught of eucalyptus and sericulture. The land involved is rain-fed terrain which was previously used not only for *ragi* but also for pulses. In the coming five years, under the World Bank project, nearly 12 per cent of such agricultural land is expected to go under eucalyptus, and *ragi* may well be wiped off the agricultural atlas, and we shall be face to face with another form of enforced "commerciogenic malnutrition". Children in rural areas today are not fed on fancy processed baby foods but from a porridge made from *ragi.*

There is no such thing as a free lunch indeed. The World Bank document for Karnataka claims that indirect benefits in the form of increased employment will be 39.43 million man-days, but it does not add that by the time the shift from *ragi* to eucalyptus has taken place, the loss of labour (earlier used in *ragi* cultivation) over the same period will be 137.5 million man-days. After the initial planting of the eucalyptus saplings, labour can be sent home to cool its heels for the next eight years till the trees are harvested.

Besides, social forestry involves less headaches than green revolution practice, where one has to contend with a market, and where access to fertilizers, seeds, mechanical and electrical power is chronically deficient, and labour problems lead to intense conflicts and violence. Yet, the ideology that pushed the green revolution is operative here in equal measure. Since there is a shortage of firewood, the immediate scientific or bureaucratic response is to increase absolutely the biomass stock as an automatic prescription for meeting the crisis. After the green revolution, multinationals outbid hungry peasants with better grain prices and turned stocks into cattle feed. It is the same with eucalyptus. Is the tree a cheap fuel? The fact is the wood is not even conceived as a domestic fuel. It burns too fast for one thing, so one requires larger quantities than traditional varieties like *honge.* But, more important, even if eucalyptus were available, industries would pay more for it (as they already are) than the fuel-hungry peasant can afford to fork out.

The price of *honge,* for example, is Rs.150 a ton, that of *casuarina,* Rs.200 a ton. But eucalyptus commands a price of Rs.250 to Rs.300 per ton, sometimes more, from industrial interests. Farmers who grow eucalyptus themselves do not use it for domestic fuel. And what do they do for cash while the tree grows? As Bandyopadhyay *et al.,* found out, agents from industrial houses pay growers yearly instalments till the trees are harvested. An all-win situation for the growers, a non-win game for the poor.

The spread of eucalyptus also means the decline of traditional fuel trees, since the capital stock of these is not being augmented but being transferred speedily to current account. *Hongé* oil will soon be replaced by kerosene, for which one needs cash, and the country, foreign exchange. And as traditional fodders are replaced by expensive cattle feeds which few can afford, milk supplies for the poor will be greatly diminished.

As for "social" forestry or "community participation", this will indeed flourish in a new form as the community of interests between landowners and the captains of industry begins to take shape. In fact, the entire countryside social forestry programme, rooted as it is in new and growing markets for the produce, is already leading to the decay of traditional ties that once provided the social organization essential for the production of traditional food crops. Eucalyptus, as Bandyopadhyay *et al.,* point out, has provided a way for farmers to make profits from the land without the correspondent dependence on the community. This detachment from the community is in turn leading to insurmountable problems in generating genuine community participation in the utilization of common uncultivated and unforested lands for raising village woodlots, the principal aim of social forestry, and without which the outlook for firewood will indeed be bleak.

The amazing part of the social forestry story is the successful manner in which "developers" have been able to pass off an anti-social forestry plan as a social forestry project. Considering the large sums involved, it is difficult to see how these projects will be brought to a halt or drastically modified. The fact is the programme is indeed the only resort available and could be led to produce more beneficial and lasting results were a few simple procedures to be followed, which would include the banning of commercial trees on agricultural land, and a return to the traditional wisdoms regarding social forestry that grace the excellent pages of B.V. Krishnamurti's studies. The money is available in generous quantities, but common sense and a concern for the quality of life of the rural poor have disappeared, like our older, more caring and benevolent trees. ■

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* *The Social, Economic and Ecological Impact of Social Forestry in Kolar,* by Vandana Shiva, Jayant Bandyopadhay and H. C. Sharatchandra. *The Deteriorating Eco-Economic Scene in South Mysore,* by B. V. Krishnamurti. (Both available from: Indian Institute of Management, 33 Langford Rd, Bangalore 560 027, India).

APPENDIX 1.2

THE FOREST BILL

Few documents reveal more clearly the official attitude towards forests than the proposed new Forest Bill which is stated to replace the existing Indian Forest Act 1927.

Prepared in 1978 by the Central Board of Forestry following recommendations of the National Commission on Agriculture, the Bill has not yet been introduced in Parliament. Officials, including the Inspector General of Forests, deny that it is anywhere near its final stage. Copies of the draft Bill have been circulating amongst voluntary organisations and activitistgroups who have analysed it and pointed out to the Government the adverse fallout it would have on the life of the country's adivasis if implemented.

The first legislation concerning forests dates back to 1865. The Government Forest Act of that year gave the Government the right to delcare any area as a reserved forest. But there were some restrictions in it, especially that the Government could not abridge the existing "rights of communities" living in or near forests. This legislation followed the British recognition of the economic importance of forests when they felt the need for railway sleepers for the newly-laid railway lines and timber for underground structures in coal mines.

Two decades later, in 1878, the Indian Forest Act was promulgated and for the first time forests were divided into three categories: reserved forests, which were virtually government forests where it could settle, transfer or commute the rights of communities; protected forests, where the rights of communities were recorded and regulated but the Government could not commute them; and, village forests where there were no government controls over the rights of people.

The Government could take over forests from tribals and declare them reserved forests. Forest officers had magisterial powers and could arrest people without a warrant if reasonable suspicion existed of their having committed an offence inside the reserved forests.

After four amendments, the Act became the Indian Forest Act 1927 which is still in operation. This gave the Government the right to charge levy on timber and forest produce in government and other forests. The list of offences increased with the Act and maximum punishment was six months imprisonment or Rs 500 fine. The Act also modified the phrase "rights of communities" to "rights and privileges of persons", thus further reducing the access of forest-dwellers to the forest.

After independence, the Government felt the need to articulate a forest policy which it did in 1952. But the National Forest Policy was only a modified version of the policy statement on forests made by the British in 1894. Among the six permanent objectives outlined in the policy was the necessity to generate maximum annual revenue from the forests; this slowly became the dominant theme. This emphasis on revenue also accentuated the alienation of forest dwellers from their land. By blocking off areas of forests from adivasis without giving them any alternative livelihood, the Government left them with just two options: either to illegally and forcibly occupy forest land and cultivate it, or to become forest labourers earning a pittance from cutting the very

trees that provided them with their basic essentials.

Organised forcible cultivation of forest lands by tribal groups has unwittingly made them the scapegoats in the Government's ploy to increase bureaucratic control of forests. Accusing them of destroying forests, the Government states as two of the objectives of the proposed Bill the prevention of the use of forest land for agricultural purposes and regulating the customary rights of people. (The traditional burial grounds of adivasis are also often in the middle of reserved forests.) Other objectives of the proposed legislation include the prevention of large-scale deforestation, stopping private contractors in the forests and maximising revenue.

In the draft legislation the list of offences has increased and includes "gathering forest produce" which it defines in detail: in the list of 36 forest products are included grass, flowers, leaves, branches, things that adivasis collect at present without restrictions.

Included in the Bill's 15 chapters and 143 sections are powers by which "any land whatsoever...which the State government declares to be a forest", becomes a reserved forest. Furthermore, forest settlement officers, who deal with disputed areas in reserved forests, will have powers of a civil court to settle any claim on reserved forest area. These disputes usually involve adivasis.

Forest officers will also have powers to arrest without warrant and punishment for committing any of the many listed offences, including gathering forest produce, can be three years imprisonment, fine up to Rs 5000 or both. Punishment could be doubled if the crime is committed "after sunset or before sunrise".

These and other provisions of the proposed Forest Bill have to be seen against the background of the effect they will have on the adivasis. If caught in the act of collecting firewood, flowers or fruit, all actions which have been an integral part of their existence, the adivasis will face the strong punishment prescribed in the Bill. Meanwhile the real plunderers of the forests, the private contractors, working for the timber-based industries, will continue to find few obstacles in their way. Even if private contractors are stopped from entering reserved forests, the experience of States where govenment-run Forest Development Corporations have been formed, is that the very same contractors find their way in, this time working for a nationalised corporation.

Source : The State of India's Environment, 1982:
A Citizen's Report, C.S.E. New Delhi.

APPENDIX 1.3. Solution of Financial Constraint

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IDA NEWS RELEASE NO. 83/8
August 5, 1982

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INTERNATIONAL DEVELOPMENT ASOCIATION APPROVES $33 MILLION CREDIT TO ASSIST INDIA IN SOCIAL FORESTRY PROJECT

The International Development Association (IDA) has approved a credit of SDR 29.4 million ($33 million) for a project to help increase the supply of fuelwood and improve environmental conditions in two Indian states.

The $67.1 million project will establish 111,000 hectares of tree plantations on private and public wastelands throughout the two northern states of Jammu and Kashmir, and Haryana which have a combined population of about 19 million. Most of the people live in rural areas and depend on fuelwood and dung for almost all their energy needs. Existing plantations are not able to provide an adequate fuelwood supply.

About 35% of state forests in both states is practically tree-less because population pressures and increasing numbers of livestock have resulted in erosion and indiscriminate cutting of trees. The plantations under the project will bring idle or under-utilized lands into productive use. These plantations will be carried out in village woodlots and on private farms, wastelands along roads, canals, and railways, wetlands, alkaline/saline lands, as well as in degraded forests.

The project should result in an increase in the supply of fuelwood sufficient to meet the needs of about 450,000 people. The plantations will also provide small timber, bamboo, poles, fodder, fruit, oilseeds, and other forest products, thus generating employment and a marketable surplus. The project's environmental impact will be felt as the soil is conserved, hills and sand dunes are stabilized, and soil fertility is restored.

The planting programs will be supplemented by public information and education efforts. The Social Forestry Wings in the Forest Departments and the social forestry training schools of both states will be strengthened. Research activities and testing of seeds will be increased to meet the needs of an expanded social forestry program. Wood-balance studies will gather vital information for the first time on the consumption and availability of fuelwood and forest-based products in the rural and urban areas of the two states.

This is the fourth social forestry project to be carried out by the World Bank in India. Similar projects are being implemented in Uttar Pradesh, Gujarat, and West Bengal.

The Government of India and the states of Jammu and Kashmir, and Haryana are providing the project with $34.1 million. The IDA credit is for 50 years, including 10 years of grace; it carries no interest but bears a small annual service charge of 0.5% on the undisbursed balance of the credit, and 0.75% on the disbursed balance. The credit will be committed when funds are available.

NOTE: IDA credits are denominated in SDRs (Special Drawing Rights), which are valued on the basis of a "basket" of currencies. The U.S. dollar equivalent of the SDR amount of the IDA credit reflects the exchange rates existing at the time of negotiation of the credit.

APPENDIX 1.3 Solution of Financial Constraint

Source: World Bank, 1982.

LIST OF FUELWOOD SPECIES

Sl. No.	Botanical name	Local name	Recommended for region	Copp-cing power	Firewood value		Other uses
					Sp.gr	Kcal/kg	
1	2	3	4	5	6	7	8
1.	*Acacia auriculiformis*	Bangali baval	DTr, MTr	P	0.6 -0.78	4800	T,O
2.	*Acacia dealbata*	Silver wattle	ST	P	0.7 -0.85	3500/4000	G,Ta,Fo
3.	*Acacia nilotica*	Baval	MT,WT,DTx	G	0.67-0.68	4800/4950	T,G,Ta,Fo
4.	*Acacia tortillis*	Israeli baval	DTr, Saline	VG	-	4400	Fo
5.	*Acer acuminatum*	Mandor	MT	F	0.5 -0.6	-	-
6.	*Albizia lebbek*	Siras	MTr,WSt,DSt,WTr, DTr	VG	0.55-0.6	5200	Fo, T
7.	*Albizia procera*	Safed siras/ Gurad	WTr,MTr,WSt MSt	-	-	-	T, Ta,
8.	*Alnus acuminata*	Rum Rum	WSt,MSt,MT,WT	G	0.5 -0.6	-	T, Fo
9.	*Alnus nepalensis*	Indian alder	WSt,MSt,MT,WT	F	0.32-0.37	4600	T
10.	*Anogeissus latifolia*	Dhawdo	MTr, DSt, MSt	E	0-9	4900	Fo
11.	*Anogeissus pendula*	Kalo dhavdo	DTr	E	-	-	Fo
12.	*Calliandra colothyrsua*	Calliandra	WSt, DSt, ST,MT	F	0.51-0.78	4500/4750	-
13.	*Cassia siamea*	Kashid	MTr, DTr	G	0.6 -0.8	-	T
14.	*Casuarina equisetifilia*	Saru	MTr,WTr coastal	P	0.8 -1.2	4950	T,O
15.	*Dalbergia sissoo*	Sissoo	MTr,WTr,MSt,DTr DSt	VG	-	-	T.P.Fo
16.	*Eucalyptus camaldulensis*	Red-gum	DTr, DSt	VG	0.6	4800	T,Gm
17.	*Eucalyptus globulus*	Blue gum	S.T.	VG	0.8 -1.0	4800	T,P.O
18.	*Eucalyptus grandis*	Rose gum	MSt	VG	0.4--0.55	-	T,P,O
19.	*Eucalyptus robusta*	Swamp mahogany	Wet land region	-	-	-	T
20.	*Eucalyptus tereticornis*	Nilgiri	DTr, Coastal region Saline & Alkaline region, Westland region	E	-	4800	T,P,Pl
21.	*Gmeline arborea*	Shivan	WT, MTr	G	0.42-0.64	4800	C,ST,P
22.	*Holoptelia integrifolia*	Charal/Papdo	WTr,DTr MSt,DSt	E	-	-	T,Pl Fo
23.	*Leucaena leucocephala*	Soo baval	MTr, DTr, MTr	E	0.55-0.70	4200/4600	P,Fo,T,Gm
24.	*Pithecollobium dulce*	Goras amli	DTr, MTr	VG	-	5400	T,F,Fo,O
25.	*Pongamia pinnate*	Karanj	DTr, MTr	VG	-	4600	O, T,Fo,M
26.	*Populus alba*	Chita Begun	WT,DT,MT	G	-	-	P,T
27.	*P. ciliate*	Van-pipal	MT,WT,DT	G	-	-	P,T
28.	*Populus deltoides*	-	MT,DT,WSt,MSt	G	-	-	P,T
29.	*Prosopis chilensis*	Pardeshi baval	DTr	E	0.8 -0.92	5000/5500	T,Fo
30.	*Prosopis cineraria*	Kijido	DTr	F	-	5000	Fo,T
31.	*Quercus* Spp	Bani	MT,WT	G	-	-	Fo
32.	*Salix* spp.	Warunj/Niranji	DT, WTr, MTr	-	-	-	Fo,G
33.	*Salvadora oleoides*	Mithijar/Pilu	DTr	G	-	-	Fo,F,T,O,Pl,Gm
34.	*Ziziphus mauritiana*	Ber	MTr, DTr	G	0.93	4900	F,Fo

LEGENDS

A. Region

Climatic Zone	Abbreviation	
Wet Temperate	WT	Eastern Himalayas, higher hills of West Bengal, Arunachal Pradesh & Nagarlands
Moist Temperate	MT	Himalayas in Kashmir, Himachal Pradesh, Uttar Pradesh, West Bengal, Sikkim & Bhutan
Dry Temperate	DT	Ladakh, Lahul Spiti, Inner Gerhawal, Sikkim
Southern Temperate	ST	Hills of Tamil Nadu and Kerala
Wet Sub-Tropical	WSt	Parts of Uttar Pradesh, Himachal Pradesh, West Begal, Assam, Arunachal Pradesh, Tripura, Manipur & hills of Madhya Pradesh, Maharashtra, Orissa
Dry Sub-tropical	DSt	Parts of Jammy, Punjab, Haryana, Uttar Pradesh & Himachal Pradesh
Wet-Tropical	WT	Tropical area of Maharashtra, Karnataka, Tamil Badu, Kerala, West Bengal & Assam
Moist-Tropical	MTt	Parts of Andhra Pradesh, Assam, Arunachal Pradesh, Bihar, Gujarat, Kerala, Karnataka, Maharashtra, Madhya Pradesh, Orissa, Tripura, Uttar Pradesh, West Bengal
Dry Tropical	DTr	Parts of Maharashtra, Gujarat, Madhya Pradesh, Andhra Pradesh, Rajasthan, Tamil Nadu, Karnataka, Punjab, Uttar Pradesh, Bihar, Orissa & West Bengal

B. Coppicing Power

Excellent	E
Very good	VG
Good	G
Fair	F
Poor	P

C. Other uses

Timber	T
Tannin	Ta
Fruits	F
Fodder	Fo
Gum	G
Green manure	Gm
Oil	O
Pulp	P
Plywood	Pl

APPENDIX 2.1 The Message of Indian Chipko Movement

(*Reprinted from MYFOREST Vol. 18, No. 4, December 1982*)

VOLUME 18 **NUMBER 4**

MYFOREST

DECEMBER 1982

THE MESSAGE OF INDIAN CHIPKO MOVEMENT

BY

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The Message of Indian Chipko Movement*

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"This Forest is our mother home,
we will defend it with all our might".

This is the slogan of the Indian Chipko Andolan, which has given a new direction to the Indian Conservation movement in recent times. This movement was 'born' in 1974, in a remote village called Reni in the Himalayan District of Chamoli, bordering the Tibetan Plateau. The womenfolk of this village stood up against approximately 300 lumberjacks employed by forest contractors and physically obstructed their felling operations by hugging the trees. Their menfolk were all away at work. Their technique of saving trees was simple, non-violent and effective.

The man who started this unique movement is Mr. Chandi Prasad Bhatt,(*) a villager from the Himalayan region of Uttar Pradesh in northern India. "After that event, the state government was forced to set up an enquiry committee to see whether the concerns of the village women were justified. The committee concluded in favour of the women and as a result. 12,000 km^2 of the sensitive watershed region of the Alakananda river were declared out of bounds for the contractors of the forest department".

The Chipko movement is a unique approach to ecodevelopment in the world. Apart from wishing to save forests so as to prevent soil erosion and landslides, the Chipko movement has raised a basic social question. who should control the forest resource ? The people who live with the forest and who get their daily needs from it ? or a distant bureaucracy which wants to sell the forest to commercial enterprises making urban-oriented products ? This is a vitally important question. All concerned must find a solution taking account of the framework

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An excerpt from a Series of Radio talk on "India's Conservation movement by the author at FM Radio Station, Hobart, Tasmania.

* Tree Hugging/Embracing

(*) (a) The Goverment of India in recognition to his service to society, awarded the title of 'Padma Shree" to Mr. Chandi Prasad Bhatt in the year 1980.

(b) Mr. Bhatt has also been recently (1982) awarded the "Ramon Magsaysay Award" by the Government of the Philippines, for his remarkable social services.

in which forests and the people associated with them, can live together. For otherwise, one or the other will be dostroyed and that is what is happening there and elsewhere. Mr. Bhatt argues both are being destroyed today which results in the migration of villagers to urban areas.

Another basic question arises from the movement: who controls the resource at the local level, the men or the women? The women gather fuel and fodder. Recent surveys have shown that most village women in this region walk for about 6-10 hours on at least three out of four days for this purpose. Each time they struggle down 5000-6000ft along steep mountains carrying load of 20-30Kgs of fuel and fodder.

However, it was not the women of the village Dungri-Paintoli, who were consulted, when the Government wanted to convert a chunk of forest owned by the village Panchayat into a potato farm. The village council consisting of male members only gave away the forest to establish the research farm. They had hoped that socio-economic conditions of the village would improve, which would have meant job opportunities for local people, a school, a post office and so on.

The local women would have had to walk even further every day to collect the bare minimum of fuel and fodder. Fortunately, the village women had heard of the 'chipko movement' in the region and decided to act on this important issue by employing the chipko tactics. They united themselves, resolved and struck. Their men and Goverr ment officials were told, "you will have to chop us before you chop the trees". Even persuation by the highest district authority and the husbands of the women could not alter their determination. The project had to be ultimately abondoned due to the strong stand taken by the women.

The other positive aspect of the movement, as Mr. Bhatt argues, is that, we have mobilised people to stop tree felling, it is now our responsibility to regreen the area, as well" Today, the local organisations like the Chipko Movement run India's largest voluntary afforestation programme. They regularly organise ecodevelopment local camps, discussion on environment, afforestation programme, people's rights etc. Local villagers, students, teachers, social workers participate in these seminars and camps.

It has also been pointed out on numerous occasions that local people prefer trees which can supply both fuel and fodder. These may be slow-growing traditional trees and not the fast growing species of many a commercial forest. The other important point to mention is that every one participates in the tree planting programme. The nearby villagers undertake to care for the seedlings. Eighty eight percent of the

seedlings survive. This high success rate is due entirely to the care and interest of the people involved. This success is no doubt amazing.

The basic message of the Chipko Movement:

"We must bring people closer to their resources which is in our case forests. In that alone lies the salvation of the environment, the solution of the people's energy problem and also the path to true development," asserts Chandi Prasad Bhatt.

The message of the movement, which is based on Gandhian non-violence philosophy fortunately is being heard all over the world. Even the Indian Prime Minister Mrs. Indira Gandhi has echoed strong support for the movement on many occasions. But what is needed now is to change the basic forest policy of the region; the sooner this is done, the better.

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APPENDIX 3.1

The Ghandian Concept of Democratic Decentralisation

(a) "When our villages are fully developed there will be no dearth in them of men with high degree of skill and talent. There will be nothing in life worth having which will not be in the villages. Tomorrow they will be like in any gardens of Eden where dwell highly intelligent folk whom no one can deceive or exploit."

- Mahatma Gandhi

(b) This was further clarified in the following:

"In this structure composed of innumerable villages, there will be ever-widening but never ascending circles. Life will not be a pyramid with the apex sustained by the bottom, but it will be an oceanic circle whose centre will be the individuals always ready to perish for the circle of villages, till at least the whole becomes one life composed of individuals, never aggressive in their arrogance but ever humble, sharing the majesty of the oceanic circle of which they are integral units. Therefore the outermost circumference will not wield power to crush the inner circle but will give strength to all within and derive its own strength from it."

(c) On the true welfare of the people (rural India), Gandhi emphasised: "This cannot be worked by twenty or a hundred men getting at the centre. It has to be worked from below by the people of every village." (The Present Village Panchayat administrative system is the development of this Gandhian Philosophy.)

Source: Kripalani and Meghani, 1969;
Readings from Gandhi.

The trees of life

by John Madeley

Crisis is not too strong a word to sum up the problems which face the villages of Uttar Pradesh, India's north-easterly state. Few trees can be seen in most of the villages, little or no grass grows in between settlements. Cattle trample and graze every palatable weed to the root but they are still underfed and produce little. Villagers sometimes walk for whole days in search of fuelwood, their main energy source. Soil erosion due to lack of tree cover hinders food production. John Madeley describes here an imaginative project in India which will not only provide villagers with fuelwood but also act as a broad-spectrum boost for overall rural development.

Uttar Pradesh (UP) is one of the poorest states in India with an average per capita income of around £50 sterling a year. It is also India's most densely populated state, being home to around 100 million people. Only six countries have higher populations. Some 85 million people live in the state's 112,000 villages and, according to the World Bank, 40 million of them live at the margin of existence. Over the last 20 years, say the Bank, there has been no improvement in the lot of these rural poor. On the contrary, the lot of most people has worsened because of damage done to the life support systems of their villages.

But the people of Uttar Pradesh are fighting back. With financial help from the state government and the World Bank's International Development Association, an ambitious 5-year social forestry project was launched in 1979 that has enabled local people to back up the efforts they themselves started in 1976 to replant trees. Under the project, nearly a thousand experts are being trained to give advice on forestry matters. However, when it comes to recognizing the importance of trees to their way of life, the villagers need little advice from outside.

The project is already being described by officials as "unusually successful", almost certainly because the crisis affecting the villages means that local people are highly committed to its success. The villagers are supplying the labour and the commitment to make the scheme work; UP's state organization the Social Forestry Directorate (SFD) is supplying extension services, materials and money.

Forty administrative districts of Uttar Pradesh in the Gangetic Plains, accounting for about 70 per cent of the state's land area, are covered by the US$45 million project, the immediate aim of which is to grow trees on 52,000 hectares. Each village *panchayat* – the village committee – decides whether or not it wants to co-operate with the project; they are under no obligation to do so. But if *panchayats* decide to co-operate, they normally establish a Village Forestry Committee (VFC), membership of which is made up of villagers with a particular interest in forestry.

Development gains

Each village decides on the type of trees it wants to grow. Fast growing eucalyptus trees are popular – branches from them can be used for fuelwood only 5 years after the tree is planted – and many trees have several functions and uses. Leaves can, for example, provide fodder for cattle; bark can be used in local tanning factories. Ninety nurseries are being established and another 50 rehabilitated; in all some 8 million seedlings are to be planted.

K. M. Tiwari, Director of the SFD, stresses that the production of more wood is not an end in itself. Certainly a key aspect of the project is to increase the availability of fuelwood for local people but this has to be seen, says Tiwari, in the context of the contribution that is being made to overall rural development.

The development gains should be many-sided. The availability of more fuelwood nearer to where they live, means that there will be less drudgery for millions of people, particularly for women, in collecting wood from far away. Employment and income will be generated; cottage industries will benefit. More income is likely to be invested in village improvement projects. Perhaps of greatest importance in the long term, the project will help to maintain the environmental stability on which a satisfactory quality of life and continued food production depend.

Employment generated by the project is very important in a state which has a great deal of un- and underemployment. In total, 19.3 million man hours should be created in three stages.

The first stage, which has already started, provides employment in tasks such as digging pits and trenches; moving soil; and planting and raising nurseries. It is of key importance that the tasks are mostly being done by the poorest people in the villages who belong to the *antyodaya* group – that is the poorest people in the villages. Uttar Pradesh's overall rural development strategy is to give priority to improving the livelihoods of the *antyodaya* – a word which literally means "rise of the lowest man". Whilst it is up to the village committees themselves to decide who is employed, most appear to be ensuring that the *antydoaya* group are given first priority.

Sharing plans

A second source of employment will be created when the trees are mature and their branches suitable for use as fuelwood. People will then be engaged in the collection of wood and fodder and again there will be stimulus to local income.

There will also be employment creation through the development of cottage industries; these are more likely to expand if forest-based raw materials are available. At present there is a shortage of such products and this is acting as a severe constraint on expansion. Additional supplies of forestry materials will allow for an increase in seed available to oil mills; silkworms for textile factories; bark to tanning industries; pulpwood to art and paper cottage industries; and timber to carpentry shops and furniture factories.

On common land at Kukrail, near the UP capital of Lucknow, 30 small villages are co-operating together with the SFD to establish new plantations and a nursery. The villages are mostly dotted around the edge of the land; all have convenient access to it. Some 300 jobs have so far been created by the new forestry work. For a daily wage of 6 rupees (about £0.30) – which is slightly lower than for the area as a whole – people are digging and planting trees on previously barren land and undertaking nursery work. They work from 8 am to 6 pm for seven days a week, taking days off only on festivals which number about 25 a year.

There has apparently been little difficulty in recruiting people for this work. Many of the workers belong to the *antyodaya* group and were previously un- or underemployed, receiving little, if any regular income.

Responsibility for planting and maintenance in the new forest is shared between the SFD and the 30 Village Forestry Committees, although the intention is to gradually hand over a greater share of responsibility to the VFCs. The village leaders (*pradhans*) normally act as VFC chairmen.

When the trees reach maturity their produce will be shared between the villages. This could cause problems but attention was given at the planning stage of the project to how the sharing might be done. Kukrail is likely to have a sharing plan under which grass, leaf fodder and fruits can be collected by the villagers free of charge at a specified time. If demand exceeds supply the Village Forestry Committees will give priority to the *antyodaya* families.

Harvesting of wood will be supervised by the VFCs, with guidance, if needed from SFD staff. All villagers will be entitled to an equal supply of fuelwood, either free or at a nominal price. But the ultimate decision as to what to do with their fuelwood will rest with the villagers themselves. To help villagers get the greatest benefits from the wood, the SFD intends to set up wood stove demonstration units and show how the use of an efficient stove can halve the wood that is needed for cooking.

Community participation in self-help forestry schemes is new to India and some snags seem inevitably likely to rise. One of them – acknowledged by the World Bank – is that the better-off villagers, being the most powerful, may in practice be the major beneficiaries of the project. There is a further risk that the SFD will assert too much of a commanding position and that the villagers will not have the say over the project that they should have. Should this happen the consequences could be serious, not least because local people may become less committed to either the planting or maintenance activities.

By 1990 the SFD hopes that the annual production of fuelwood from the project will be sufficient to satisfy the total requirements of 90,000 rural households in Uttar Pradesh–or about half a million people. But as the fuelwood from the plantings will be scattered over a large area, it is in practice likely to meet the partial fuelwood needs of a larger number of families. Milk production should directly increase, and the extra fodder seems likely to result in additional milk output of some 4 million litres annually. Food crops should enjoy better growing conditions as the fertility of land improves due to nutrients being returned to the soil in leaf fodder, and also as soil erosion is checked.

The area of new forest is, however, small compared to the total forest needs of the people of Uttar Pradesh. The state's rural population is projected to increase from 85 million to 129 million people by the year 2000.

Estimates suggest that some 1.2 million ha of land will have to be planted with trees in the next 15 years if demand is to be met. This means planting 80,000 hectares annually, which in turn means that each village should establish on average around 0.7 ha annually. This is considered to be an achievable target. Clearly social forestry work in Uttar Pradesh is likely to continue long after the present 5-year project has expired.

Formerly bare hills, now forest-clad, surround and benefit the agricultural bottomlands throughout South Korea. The country's success with forestry has been largely because it involved rural people themselves in the planning, planting, and stewardship of the forests.

E. Eckholm/Firewood crops

Other Indian states are watching the UP's social forestry experience with considerable interest. Forests throughout the country are disappearing at an alarming rate and most of India's half a million or so villages face problems similar to the villages in UP. Around 40 million ha of tree cover has been lost this century and India now has only 75 million ha of land under forest area out of a total land area of 305 million ha. India could become a dessert unless forestry projects spread quickly in other areas.

Social forestry appears as though it could offer one of the best ways of reversing the tide of deforestation and environmental degradation that has hit many countries. The Uttar Pradesh project is showing that results can be achieved with the full involvement and participation of people – an involvement which they are only too willing to give. It could be said that the people of this state should have embarked on their project long before 1976.

Forward planning is vital if trees are to be available for fuelwood when they are needed. The involvement of an outside development agency–in the case of the Uttar Pradesh project, the World Bank–helped to provide the finance that the state lacked itself. The lesson from Uttar Pradesh is that forward-looking international co-operation in social forestry can help people restore the ecological balance in their area and be a tool for development. ■

John Madeley is a UK-based journalist specializing in development affairs.

The Green Wall of China

Each spring, on a set day, everybody in China, from high officials to schoolchildren, plants–or, as they put it, "replants"–a tree. This immense country is annually seized with a verdant frenzy, as if it were dreaming of the golden age portrayed on its old engravings where trees are everywhere to be seen.

There seem to be no official figures for the number of trees planted in China each year. However, a Western expert has estimated that China's tree planting campaign was so effective that 12-14,000 million trees were set in the ground in 1980. Naturally, the life expectancy of these trees varies considerably from region to region.

Just procuring the necessary number of young trees is a major task. In 1979, tree nurseries employed some 7,900 people–2,100 of whom were forestry experts. At least 2,500 tons of tree seed of many different species were gathered.

By 1985, 5.3 million hectares are expected to have been covered with trees, and, in the longer term, planting is planned for over 260 million ha. This immense area would be four-fifths the size of India; or as big as the European Community.

The Chinese now talk of constructing a second "Great Wall"–this time built of greenery. At least 7,000 kilometres long, it will run roughly parallel to the existing "Great Wall", preventing the northern part of the country from becoming more and more of a desert. Other motives are to raise the standard of living through better land management and to fight against pollution. Last year alone 920,000 ha of the "Green Wall" were planted.

In 1979, the Central Committee of the Chinese Party published a forest code. Tree felling became a serious offence and a severe fine, if not a prison sentence, was risked by doing so without official authorization. Even those authorized are to replant three new trees for every one cut down. One objective is to prevent the cities from being hemmed in by asphalt and concrete. Beijing, for instance, has three to four square metres of greenery per inhabitant, and even the famous Tien an Men (Square of Heavenly Peace) is now surrounded by pine trees.

Nanking has three square metres per inhabitant, and last year it finished planting trees along its 40 main avenues. Shanghai has only 0.4 square metres of trees per inhabitant, but it is undoubtedly the most densely populated city in the world.

The city of Wuhan, on the banks of the Yangtse River, wanted to widen one of its main avenues without cutting the plane trees which bordered it. Today, the trees are right down the middle of the widened street.

Planners are required to surround suburban towns with a curtain of trees in order to separate them from their industrial zones. Thus Chinsaw, a dormitory town for petrochemical workers in Shanghai, is completely screened from the factories by a green belt which varies in thickness from a few metres to several kilometres.

The Chinese authorities plant different trees to solve different problems. The plane tree has the thickest foliage and is thought best to bring shade to town boulevards. Along major roads and railways the eucalyptus is often chosen because it is bushier lower down and acts as a windbreak. But what about those regions where there is intense industrial air pollution?

Ms Kong Guo Hui, a researcher at the Botanical Gardens in Canton, has compiled a short-list of pollution-resistant trees. Her research has two objectives.

Firstly, plants can serve as indicators of danger. When vegetation that is normally resistant to smoke and fumes starts to wilt, it can be a warning that pollution has reached a hazardous level. Carefully selected plants could thus become real alarm signals.

Secondly, China's scientists have wondered whether plants that are very resistant to polluted air might not actually be consuming the toxic substances out of the air. Ms Kong, for example, has tried to calculate how much pollution each plant "eats". The figure, of course, is small–a few milligrams of sulphur dioxide per kilogram of leaves. But carbon forests may offer real prospects for a new "soft" method of fighting pollution. ■

EARTHSCAN

APPENDIX 3.3. Land Resources Available for Social Forestry

1. About 13% of our land area (43.6 million ha) is potentially productive wasteland distributed amongst 567,000 villages (NCA 1973). A substantial part of this can be reclaimed through raising of fuelwood plantations of fast growing tree species. It would serve the dual purpose of protection of the biosphere and supply of the much needed fuelwood to the rural communities, the lack of which has been an important factor leading to the existing degraded conditions of such lands. It is well known that even the inferior lands can be utilised for creation of new forest resources.

2. Railways in India cover a length of 59,790 km with about 7,065 stations. The road system extends over 1,200,000 km besides the border roads extending over nearly 24,000 km. The national highways traverse over 29,000 km. An intensive programme of construction of village roads is expected in the current five years plan. Total length of canals, distributories and minors extends over 150,000 km. A network of drainage channels has been constructed in Punjab and Haryana over 20,000 km. Keeping in view that a part of the rail, road or canal sides etc. shall not be available for tree planting, it is estimated that the area available for tree planting along roads, railways, canals etc. is about 902,000 ha which is quite a significant area for raising tree plantations.

Source: Reference Note 21.

APPENDIX 3.4. Uncultivated, Unforested Land for Social Forestry

Perhaps forty percent of India's land is uncultivated, unforested, and potentially available for social forestry development. Little is known systematically about the differential capacities of these lands to support productive social forestry systems. Nor is there much systematic knowledge about how the productivity of these lands will respond to environmental modification. In both cases, a tremendous amount of local knowledge exists, but it has yet to be drawn into a comprehensive view that will guide priority-setting for research and development. Site qualities on uncultivated lands must begin to draw analysis approaching the rigor that has heretofore been applied only to agricultural lands.

Source: Reference note 3.